48 Days of Preventive Medicine
International Congress

48. Дани превентивне медицине - Међународни конгрес

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Faculty of Medicine Niš, University of Niš
Медицински факултет у Нишу, Универзитет у Нишу

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BOOK OF ABSTRACTS
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48. DAYS OF PREVENTIVE MEDICINE
48. DANI PREVENTIVNE MEDICINE

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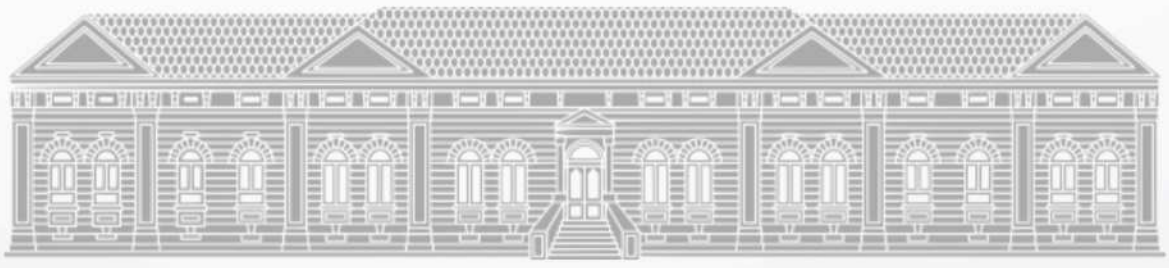

48 Days of Preventive Medicine
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48. Дани превентивне медицине - Међународни конгрес

MAIN TOPICS

Actual public health problems of communicable diseasess
Epidemiological characteristics and importance of mass
chronical noncommunicable diseases
Microbiology today
Current parasitoses
Environment and health
Nutrition and health
Indicators of health condition and functioning of the health system
Current challenges in health promotion

GLAVNE TEME

Aktuelni narodnozdravstveni problemi zaraznih bolesti
Epidemiološke karakteristike i značaj masovnih
hroničnih nezaraznih bolesti
Mikrobiologija danas
Aktuelne parazitoze
Životna sredina i zdravlje
Ishrana i zdravlje
Pokazatelji zdravstvenog stanja i funkcionisanje zdravstvenog sistema
Aktuelni izazovi u promociji zdravlja

The continuing education program was accredited by the decision of the Health Council of the Republic of Serbia No. 153-02-1979/2014-01 from 19.05.2014.

The number of points assigned to the International Congress is:

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poster prezentacije:	**11 bodova**
pasivno učešće:	**9 bodova**

A. PLENARNA PREDAVANJA
A. PLENARY LECTURES

THE GROWING BURDEN OF NON COMMUNICABLE DISEASES – ARE THERE STRATEGIES TO CONTROL AND ADDRESS THEM?

Eleni Jelastopulu

Department of Public Health, School of Medicine
University of Patras, Greece

Over the last two decades, the global health landscape has undergone rapid transformation. People around the world are living longer, and the population is getting older. Many countries have made remarkable progress in preventing infant mortality. As a result, disease burden is increasingly defined by disability instead of premature mortality and people are experiencing more non-communicable diseases or chronic diseases, such as cardiovascular diseases, mental disorders,cancer and diabetes.

With the “Global burden of diseases, injuries, and risk factors” (GBD), an approach to global descriptive epidemiology, we have a tool to demonstrate the size of the problem worldwide or in selected countries, to quantify the comparative magnitude of health loss due to diseases and other conditions or risk factors and to understand with various indicators, such as all-cause mortality, deaths by cause, years of life lost (YLLs), years lived with disability (YLDs), and disability adjusted life years (DALYs),in a given place, time, and specific population, what are the most important contributors to health loss.

In terms of the number of years of life lost (YLLs) due topremature death in Serbia, ischemic heart disease,cerebrovascular disease, and trachea, bronchus, and lungcancers were the highest ranking causes in 2010.Overall, the top five leading causes in terms of years lived with disability (YLDs)for all ages were low back pain, anxiety disorders, major depressive disorder, falls, and diabetes.Of the 25 most important causes of burden, as measured bydisability-adjusted life years (DALYs), major depressive disordershowed the largest decrease, falling by 28% from 1990 to 2010, whereas Alzheimer’s disease shows the highest increase, followed by hypertension, colorectal cancer and diabetes.The leading risk factor in Serbia is dietary risks.

Analyzing the epidemiological changes occurring in Serbia the last 20 years in terms of disease burden gives policy makers the crucial input for informed policy- and decision-making. Identifying a population’s true health challenges helps to implement the “best-buy” intervention strategies to prevent and manage NCDs and risk factors.

PUBLIC HEALTH IMPORTANCE OF INFECTIOUS DISEASES

Zoran Radovanović

Academy of Medical Sciences, Serbian Medical Society, Belgrade

Objective: To present historical background, current situation and potential impact of infectious diseases on the global public health.

Methods: Review of the scientific literature.

Results: Infections had a major impact on the rise and fall of civilizations, and their killing power exceeded the combined effect of wars and famines (H. Zinsser). Classical infectious diseases have nowadays a negligible share in the developed nations' mortality, while their role in the third world is diminishing. It should not be missed, however, that such a state of affair has been maintained only due to energetic and persistent preventive and control measures. Awareness of public health importance of microbes has got the momentum along with discoveries that they are responsible for many conditions previously considered non-contagious. Moreover, viral permanent ability to evolve, as demonstrated recently by occurrence of new strains of avian influenza, SARS, and MERS (CoV), positions them as the most important single threat to the human dominance on the planet (J. Lederberg).

Conclusion: The role of microbes in the occurrence of many diseases, including ulcer, different forms of cancer etc., points to their public health importance. The ease and unpredictability of microbial changes urges us to keep our guard on and develop ever improving means to confront them.

Key words: public health, epidemiology, infectious diseases, burden of disease

SESSION: MICROBIOLOGY TODAY

INVITED LECTURES

1.IMUNSKI ODGOVOR NA BAKTERIJE IZ RODA *HELICOBACTER*

IMMUNITY TO *HELICOBACTER*

Biljana Miljković-Selimović[1,2], Tatjana Babić[1], Branislava Kocić[1,2]

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[2]School of Medicine, University in Niš, Serbia

ABSTRACT

Genus *Helicobacter* comprises of more then 30 validated and candidatus species, some of them have been recognized in two last decades, with type species *Helicobacter pylori* (*H. pylori).* Virulence factors of *H. pylori* that prticipate in etiology of disease are numerous. Cytotoxin-associated gene pathogenicity island (*cagPAI*) is marker for Cag^{+}strains. *H. pylori* peptidoglycane elicits stimulation of nucleotide-binding oligomerization domain (NOD). Vvacuolating cytotoxin A (VacA) possess several genotypes which of them *vacA* s1/m1 is the most often associated to severe di,

seases. Outer memrane proteins (OMPs) participates in adhesion and blood group antigen binding adhesion protein (BabA) enables binding *H. pylori* to Lewis b (Le^{b}) blood groop antigens, as a receptor of *H. pylori* for gastric epithelial cells. Other virulence factors are outer inflammatory protein adhesion (OipA), sialic acid-binding adhesion (SabA), adhesion proteein for bindinf to sialic acid, proinflammatory lipopolysaccharide (LPS), urease etc.

Althogh bacterial virulence play a key role in pathogenesis, human predisposition and human immune response can be blamed for etiology of the illness. Perhaps more then a half of human population is infected with *H. pylori*, yet only small number develope any type of disease. *H. pylori* infectin is folowed by Th1 immune response. Data indicate that individuals who can overcome the initial Th1-cell-dominated response, with a mixed Th1- and Th2-cell response to in the gastric mucosa, may maintain persistent colonization without manifestations of clinical diseases. Also, it is considereed that Th1 cellular immune response has a protective role in etiology of hypersensitivity contributing to the „hygiene theory".

There are also a *Helicobacters* that can cause gastric disorders in animals similar to human diseases: almost any animal has its own bacterium, although some species can infects sevesral hosts. However these Non *Helicobacter pylori* species (NHSP) can cause disease humans that have close contact to animals. NHSP can be for didactic reasons classified to gastric and enterohepatic helicobacters. Gastric helicobacters usually cause disease in animal host and they are rarely human parasites with exception of *H. heilmannii. Some of the species also primary isolated in animals, enterohepatic helicobacters may be associated with human hepatobilliar disease, enterocolitis and even inflammatory bowel diseases (IBD). It is considered that in H. hepaticus infection* IL-23 plays a key role in induced T cell–dependent colitis.

Key words: *Helicobacter pylori*, helicobacters, immunity

H. pylori is a Gram-negative non spore forming, s-shaped or curved bacillus 0.5-0.9 μm by 2-4 μm, with 1 to 3 turns when observed *in vivo. In vitro s*piral forms are less obvious with cells appearing more frequently as singly curved or u-shaped rods. It possesses up to six sheathed polar flagella. Bacteria are motile by action of flagella. It grows in microaerophilic conditions on supplemented blood agar at 37°C usually for 3-5 days. Colonies are grayish, circular (1-2 mm) convex, translucent, sometimes with slight haemolysis in blood agar around colonies (Owen, 1998).

The first time when gastric spiral bacteria were seen were in 1893 by Bizzozero, who described helical bacteria in the canine stomach, and then in 1896, by Salomon who reported similar microorganisms in the stomachs of cats and mice. Spiral bacteria in the human gaster were described in 1906, when Krienitz made his observation in patients with gastric carcinoma, and later Rosenow and Sanford reported on the presence of such type of spiral bacteria in the stomachs of patients with ulcer disease (Buckley and O'Moraint, 1998). These findings were considered contamination or artifacts for about a century.

Discovery of *H. pylori* in the gaster of patients with gastritis and ulcer emphasized the association between bacterium and disease in 1982 from Australian medical doctors, Marshall Warren (Marshall et Warren, 1984), as well as proving the Koch's postulates. Namely, Marshall and his co-worker ingested *H. pylori* suspension, which was followed by occurrence the disease and subsequently healing with antibacterial treatment. That discovery undermined conventional ideas that bacteria cannot live in the stomach and particularly that they cannot be responsible for etiology of gastritis and ulcer disease. Marshall's and Warren's long-term efforts rewrote the classic medical textbooks and in 2005 they were awarded Nobel Prize in Medicine.

At first, *H. pylori* were classified in the genus *Campylobacter* as *C. pyloridis*, then as *C. pylori,* but later work described new genus *Helicobacter* in 1989 (Goodwin et al., 1989) and it was removed into the family *Helicobacteraceae.* In 1991, Vandamme with coworkers proposed description of genus *Helicobacter* with the inclusion of two further species: *H. cinaedi* and *H. fennelliae. H. pylori* were positioned in the Delta and Epsilon subdivision of the Purple Bacteria (Proteobacteria). The most closely associated genera were *Wolinella* with one species, *W. succinogenes,* and *Campylobacter* (Owen, 1998). Nowadays, *based* on 16S rRNA sequences, the phylogenetic tree is represented with 18 validated *Helicobacter* species, two candidate species, and nine additional provisional species (Solnick and Vandamme, 2001). *H. baculiformis* is the last formally named *Helicobacter* species isolated from the stomach of a cat (Baele et al., 2008) while *H. callitrichis* and *H. macacae* are isolates that will probably represent a new helicobacters (Moyaert et al., 2008). However, *H. pylori* is the type strain and genus representative.

Transmission of *H. pylori* from human to animals is extremelly rare event and were not described until two outbreaks of increased mortality associated with gastric bleeding and weight-loss in a captive colony of the Australian marsupial, the stripe-faced dunnart (*Sminthopsis macroura*) (Every et al., 2011)**.**

Perhaps more than a half of human population is infected with *H. pylori*, yet only small proportion develops any type of disease. *H. pylori* infection is the most often related to human gaster and it appears as several non-malignant illness and malignancy. Non malignant diseases are gastritis, peptic ulcer, gastroesophageal reflux disease, gastric polyps, nonsteroidal-anti-inflammatory drug⁄aspirin-induced gastric injury and functional dyspepsia

(Furuta et Delchier, 2009). Human malignancy caused by *H. pylori* is gastric carcinoma and mucosa associated lymphatic tissue (MALT) lymphoma.
Virulence factors of *H. pylori* are numerous. Cytotoxin-associated gene pathogenicity island (*cag*PAI) is marker for Cag^{+}strains. *H. pylori* peptidoglycane elicits stimulation of nucleotide-binding oligomerization domain (NOD). Vacuolating cytotoxin A (VacA) possess several genotypes which of them *vacA* s1/m1 is the most often associated to peptic ulcer and gastric carcinioma. Outer memrane proteins (OMPs) participates in adhesion and blood group antigen binding adhesion protein (BabA) enables binding *H. pylori* to Lewis b (Le^{b}) blood groop antigens, as a receptor of *H. pylori* for gastric epithelial cells. Other virulence factors are outer inflammatory protein adhesion (OipA), sialic acid-binding adhesion (SabA), adhesion proteein for binding to sialic acid, proinflammatory lipopolysaccharide (LPS), urease, etc. Numerous studies have demonstrated the phenotypic and genotypic diversity in *H. pylori* strains, responsible for different types of inflammatory responses in the host as well as versatile clinical outcomes of diseases (Kusters et al., 2006).

It is supposed that CagA is a major virulence factor of *H. pylori* also involved in an increased cancer risk. CagA is the protein that mediated a type IV secretion system, localized in to inner surface of host cell membrane. CagA 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. Existance of a higher risk for cancerogenesis is observed in strains with a high degree of phosphorylation in EPIYA motifs (Karlsson et al., 2012)**.**
VacA induces vacuolization in gastric epithelial cells as well as apoptosis *via* the mitochondrial pathway. DNA sequence analysis revealed that the VacA protein has a mosaic structure comprising allelic variations in the signal (s) and mid region (m) and being associated with gastric carcinoma and gastric mucosal atrophy. Besides these two structures, intermediate (i) region, located between the s and m regions and deletion (d) region has been described. The d region is located between the vacA i and m regions. This polymorphism in *cagA* and *vacA* genes play an important role in in *H. pylori* pathogenesis (Karlsson et al., 2012)**.**
Investigations on the *vacA* gene, encoding the vacuolating toxin, indicate its presence in all strains. Substantial sequence polymorphisms within *vacA* can be found in the coding sequence for the s-region, and in the middle (m) region. It is considered that the strains of the *s1/m1* subtype produce higher levels of the vacuolating cytotoxin than other genotypes, while *s2/m2* strains do not secrete *vacA* (Marie 2012). Another group of investigators has found three genotypes: s1/m, s1/m2, and s2/m2. That study showed a significant correlation between the *vacA s1/m2* genotype and gastritis and a significant correlation between *vacA s1/m1* genotype and peptic ulcer. The results of that study might be useful for the identification of high-risk patients who are infected by *vacA s1/m1* genotype of *H. pylori* strains. *Finally, H. pylori* strains with *vacA* type s1 as well combination of s1/m1 associated with peptic ulceration and the presence of *cagA* gene may serve as excellent marker for disease development (Marie, 2012).
H. pylori induce both innate and specific immune responses. The humoral immune response does not have a protective role in *H. pylori* infection, while cell immunity predominates and participates in disease etiology, disease outcome and perhaps could have protective role. Innate epithelial defense depends on TLR and NOD-like receptor (NLR) activation which induces a *H. pylori* specific T helper (Th) 1 immune response. The degree of mucosal damage is in correlation with neutrophilic infiltration. It seems that the *H. pylori* neutrophils activating protein (HP-NAP) is the key factor in the generation of Th1 response and interleukin synthesis in monocytes, dendritic cells, and neutrophils are the consequence of TLR2

activation. Activation of TLRs differs from other Gram - negative bacteria: *H. pylori* LPS activates TLR2 rather than TLR4 (Del Giudice et al., 2001), while *H. pylori* flagella which cannot activate the TLR5 in some degree may contribute evading immune response (Andersen-Nissen et al., 2005). *H. pylori* infection which activates Th1 subset can lead to the synthesis of proinflammatory cytokines: IFN-γ, IL-12, IL-18 and tumor necrosis factor (TNF)-α. The degree of gastritis is in correlation with TNF-α and IFN-γ expression. Peptic ulcers are associated with *H. pylori* specific local gastric Th1-cell responses (Bergman et al., 2006). A strong Th1 mucosal response is associated not only with the progression of gastric mucosa damage, but also with atrophic gastritis and gastric adenocarcinoma (Kusters et al., 2006)**.**

Another mechanism which enables *H. pylori* to induce gastric mucosal atrophy and ulcer development can be increased regulatory T cell (Treg) activation by bacterial antigens. This is the pathway for *H. pylori* for immune evasion from host immunity. However not only *H. pylori* gastritis is associated to Treg accumulation, yet in peptic ulcer disease, elevated Treg control the inflammation enabling bacterial persistence. Nevertheless, T reg cells have protective role from extensive gastric inflammation, gastric colonization and progression of *H. pylori* infection in malignancy (Kusters et al., 2006). Besides immune mechanisms, some studies emphasize the role of *cagA* genotypes in the development of gastroduodenal sequels while in contrast to other studies, they cconsidered that *vacA* genotypes were not related to disease progression or its outcome (Karlsson et al., 2012).

In the subgroup of patients with asymptomatic chronic gastritis most *H. pylori*-specific gastric T cells are Th0 cells, which secrete both Th1 and Th2 cytokines (D'Elios et al., 1997) having mixed Th1- and Th2-cell response to *H. pylori* in gastric mucosa, and maintaining persistent colonization without developing clinical disease (Bergman et al., 2006)**.** One of the proposed mechanism by which *H. pylori* persist on mucosal surface without any damage it is that some phase variants of *H. pylori* can bind a specific cell-surface receptor on dendritic cells, suppressing the development of Th cells into Th1 cells through IL-10 (Bergman et al., 2004). Variants of *H. pylori that* are selectively to specific DCs subsequently migrate to the gastric lymph nodes and suppress the development of Th cells into Th1 cells (Bergman et al., 2006).

H. pylori have important role in two types of gastric malignancy: gastric carcinoma and MALT lymphoma. However, malignancy occurs only when individuals are infected with specific *H. pylori* strains and when specific host response occurs. Malignancy is associated with s1/m1 strains and some with s1/m2 strains which were exclusively i1, and s2/m2 that are exclusively i2. That why, i region may serve as an independent marker of gastric carcinoma and its typing may be sufficient for the identification of all pathogenic forms of *H. pylori* vacA and useful in cancer prevention (Rhead et al., 2007).

In carcinogenesis a high level of pro-inflammatory cytokine IL-1 expression (IL-1β) and up regulation of *IL1RN gene* (which encodes the receptor antagonist of IL-1β) consecutively decrease gastric acid secretion and increase the risk for atrophic gastritis. These events associated with predominant corpus *H. pylori* colonization and pangastritis occur in individuals with increased risk of carcinogenesis (El-Omar et al., 2000; Furuta et al., 2002). Some polymorphic types of IL-1 and TNF-α gene-cluster play paramount role in etiology of carcinoma (El-Omar et al., 2003)**.** Also, in anti-inflammatory cytokine IL-10 certain gene polymorphisms are associated with an enhanced anti-inflammatory response or decreased level of IL-10 favoring the pro-inflammatory response (Kusters et al., 2006). Indeed, *H. pylori, can change the epithelial cells signaling* contributing to the gastric carcinogenic process. A combination of CagA-dependent and CagA-independent signaling was both required to stimulate cancer cell motility (Snider et al., 2008).

Apoptosis may be under the influence of the genotype of the infecting bacteria. Although *H. pylori cagPAI*-negative strains can induce this process, the expression of *cagPAI* promotes

apoptosis more rapidly than in *cagPAI* negative strains (Minohara et al., 2007). The major *H. pylori*-induced apoptotic pathway in gastric cancer (GC) cells requires the activation of caspases-3 and -9 (Zhang et al., 2007). However, gene that encodes β-catenin can function as an oncogene (Wang et al., 2008), increasing β-catenin production in patients with malignancy (Saldanha et al., 2004).

In addition to genetic alterations, epigenetic changes are also involved in cancer development and progression. *H. pylori* infection may be linked to hypermethylation, thus increasing the rate of promoter methylation in E-cadherin, and death-associated protein kinase in the noncancerous gastric mucosa of GC patients (Kaise et al., 2008). In GC a shift to the Th2-mediated humoral immunity can appear in the advanced stages of the disease. Elevated production of suppressive cytokine might lead to a decreased cytotoxic antitumor T-cell response in the stomach, contributing to tumor progression (Ferreira et al. 2008).

In gastric MALT lymphoma, CD4+T cells stimulate the proliferation of neoplastic B cells. These B cells synthesize auto-antibodies and differentiate to varying degrees into mature plasma cells (Parsonnet et al., 2004). Although gastric mucosa does not normally contain lymphoid tissue, MALT appears in response to colonization with *H. pylori*. A monoclonal population of B cells may arise from this tissue and slowly proliferate to lymphoma (Kusters et al., 2006). Furthermore, studying the immunoproteome evidence showed the variability of the antigenic pattern among *H. pylori* strains, which represents the unusual extent of genetic heterogeneity due to the high rates of mutation and recombination events *in vivo* (De Reuse et Bereswill, 2007).

There are also a h*elicobacters* that can cause gastric disorders in animals similar to human diseases: almost any animal has its own bacterium, although some species can infects several hosts. However, these non-*Helicobacter pylori* species (NHSP) can cause disease in humans that have close contact to animals. NHSP can be for didactic reasons classified to gastric and enterohepatic helicobacters. Gastric helicobacters: *Helicobacter heilmannii, H. felis, H. mustelae, H. acinonychis*, *Helicobacter nemestrinae, H. salomonis, H. bizzozeronii,* "*H. suncus*", "candidatus *Helicobacter bovis*" usually cause disease in animal host and they are rarely human parasites with exeption of *H. heilmannii*.

Adaptation of bacteria to gastric bile reflux may select for various gastric and intestinal *Helicobacter* species and to invade the biliary tract and human liver by an ascending infection or transport by blood borne macrophages. However, the continuous discovery of non culturable new species suggests that PCR-based as well as immunodiagnostic methods should be developed to study these infections and their relation to ulcerative colitis and other forms of inflammatory bowel disease (IBD), Sjögren syndrome, and possibly other autoimmune diseases (Wadström et Ljungh, 2002**).**

Some of the species of enterohepatic helicobacters also primary isolated in animals as *H. hepaticus, H. cinaedi, H. fennelliae, H. canis, H. pametensis, H. pullorum**,** H. canadensism, H. muridarum, H. rappini, H. bilis, H. trogontum, H. aurati m*ay be associated with human hepatobilliar disease, enterocolitis and even IBD.

Intestinal *Helicobacter* species can enter the bloodstream, and therefore can be expected that it could enter the liver. Despite detection of helicobacter 16s rDNA in liver tissues by PCR, there have been no published data of helicobacter cultivation or ultrastructural identification (O'Rourke et al., 2001)**.** Helicobacters which may be cultured from human diarrheal samples include: *H. cinaedi, H. canis, H. pullorum, H. fennelliae, H. canadensis, H. rappini* and other unclassified but related organisms. The data obtained by studying symptomatic and asymptomatic individuals and experimental evidence implicate *H. cinaedi* and *H. fennelliae* in the etiology of human intestinal disease while *H. pullorum* and *H. canadensis* have been cultured from immunocompetent and immunodeficient human patients presenting with acute or chronic diarrhea. *H. rappini and H. canis* has been isolated in patients with gastroenteritis

(O'Rourke et al., 2001).

The incidence of the chronic IBD, Crohn's disease (CD) and ulcerative colitis (UC) has increased during the last two decade. Healthy individuals maintain a symbiotic relationship with bacteria that populate their gastrointestinal tracts (Matharu et al., 2009).

In the last decades, *H. hepaticus* is implicated in etiology of IBD. Individuals with IBD are at a higher risk of developing colon cancer than the general population because imbalances in both innate and adaptive immune cells, such as natural killer (NK) cells and T cell subsets, CD4+, CD8+T, and Treg cells. The inflammation and damage caused by increased secretion of inflammatory cytokines during an active disease state is thought to be triggered by cytotoxicity against the commensal bacteria. Induction of inflammatory cytokines synthesis can result from the disruption of the homeostatic balance between Treg and effector T helper (Th) cells. Elevated levels of pro-inflammatory CD4+T cells and extensive CD8+T cell infiltration are also important in the pathogenesis of UC in humans. Transforming growth factor (TGF)-β mediates many diverse biological functions on different cell types. TGF-β dysfunctions in one or more signaling pathways are commonly observed in human IBD and colon cancer development.

Additionally, it is demonstrated that disruption of one of the transcription factor modulates colitis susceptibility following infection with certain *Helicobacter spp*. Among these, *H. hepaticus* may be of great importance. *H. hepaticus* induce a moderate inflammatory response in the cecum and colon of rodents, eventually leading to mucinous adenocarcinoma formation. It is generally accepted that chronic low levels of inflammation lead to cancer promotion and progression. There are data that imply that defects in some signaling process increase susceptibility to colitis induced by *H. hepaticus* involving aberrant activation function impairment of effector lymphocytes (McCaskey et al., 2012).

Also, it is considered that in *H. hepaticus* infection, IL-23 plays a key role in induced T cell–dependent colitis. Namely, IL-23 but not IL-12 is essential for the development of intense IBD. It is considered that IL-12 predominates in host defense against intracellular microbes (NK cell and IFN-γ production) stimulating differentiation of Th1 cells. Recently, IL-23 was identified as a new member of the IL-12 cytokine family secreted by activated DCs and macrophages. IL-23 was originally described to induce the proliferation and secretion of IL-17 by CD4+T cells and such CD4+T cells were subsequently shown to be strong inducers of immune pathology. Recent studies have established that IL-17+ CD4+ T cells represent a novel subset of Th cells (Th17 cells) that also produces proinflammatory cytokines as IL-6 and TNF-α, and mobilize neutrophils driving to chronic inflammation (Kullberg et al., 2006). IL-17–producing CD4+T cells alone are capable to induce autoimmune tissue reactivity. It seems that model in which IL-23 drives both interferon **γ** and IL-17 responses that together synergize to trigger severe intestinal inflammation may be completely truthful (Kullberg et al., 2006). A quantitative and qualitative microbial imbalance in UC, defined as dysbiosis, has been characterized by an increase in *numerous enterobacteria and m*ore specifically enterohepatic *Helicobacters* were more prevalent in tissue sample from UC patients subjected to molecular detection methods, but not controls (Sasaki et Klapproth, 2012).

REFERENCES

1. Andersen-Nissen E, Smith KD, Strobe KL, Barrett SL, Cookson BT, Logan SM, Aderem A. Evasionof Toll-like receptor 5 by flagellated bacteria. Proc Natl Acad Sci USA 2005;102(26): 9247-52.
2. Baele M, Decostere A, Vandamme P, Van den Bulk K. Gruntar I. Mehle J, Mast J, Ducatelle R, Haesebrouck F. *Helicobacter baculiformis* sp. nov., isolated from feline stomach mucosa. *In. J Syst Evol Microbiol*.2008; 58: 357-64.

3. Bergman M, Del Prete G, van Kooyk Y, Appelmelk B. *Helicobacter pylori* phase variation, immune modulation and gastric autoimmunity. Nat Rev Microbiol 2006*;* 4: 151-9.
4. Bergman MP,van Vliet SJ, van Bodegraven AA, Wirth HP, Kapsenberg ML, Vandenbroucke-Grauls CM, van Kooyk Y, Appelmelk BJ. *Helicobacter pylori* modulates the T helper cell 1/T helper cell 2 balance through phase-variable interaction between lipopolysaccharide and DC-SIGN. J Exp Med 2004*;* 200: 979-90.
5. Buckley MJM, O'Moraint CA. *Helicobacter* biology – discovery. Brit Med Bull. 1998; 54(1): 7-16.
6. D'Elios MM, Manghetti M, Almerigogna F, Amedei A, Costa F, Burroni D, Baldari CT, Romagnani S, Telford JL, Del Prete G. Different cytokine profile and antigen-specificity repertoire in *Helicobacter pylori* specific T cell clones from the antrum of chronic gastritis patients with or without peptic ulcer. Eur J Immunol 1997*;* 27:1751-55.
7. De Reuse H, *Bereswill S.* Ten years after the first *Helicobacter pylori* genome: comparative and functional genomics provide new insights in the variability and adaptability of a persistent pathogen. FEMS Immuno Med Microbiol 2007; 50: 165-76.
8. Del Giudice G, Covacci A, Telford JL, Montecucco C, Rappuoli R. The design of vaccines against *Helicobacter pylori* and their development. Annu Rev Immunol 2001*;* 19: 523-63.
9. El-Omar EM, Carrington M, Chow WH, McColl KE, Bream JH, Young HA., Herrera J, Lissowska J, Yuan CC, Rothman N, Lanyo G, Martin M, Fraumeni JFJr., Rabkin CS. Interleukin-1 polymorphisms associated with increased risk of gastric cancer. Nature 2000*;* 404: 398-402.
10. El-Omar EM, Rabkin CS, Gammon MD, Vaughan TL, Risch HA, Schoenberg JB, Stanford JL, Mayne ST, Goedert J, Blot WJ, Fraumeni JFJr., Chow WH. Increased risk of noncardia gastric cancer associated with proinflammatory cytokine gene polymorphisms. Gastroenterology 2003*;*124: 1193-201.
11. Every AL, Selwood L, Castano-Rodriguez N., Lu W, Windsor HW, Wee JLK, Swierczak A, Marshall BJ, Kaakoush NO, Mitchell HM, Sutton P. Did transmission of *Helicobacter pylori* from humans cause a disease outbreak in a colony of Stripe-faced Dunnarts (Sminthopsis macroura)? Vet Res 2011*;*42: 26.
12. Ferreira AC, Isomoto H, Moriyama M, Fujioa T, Machado JC, Yamaoka Y. *Helicobacter* and gastric malignancies. Helicobacter 2008*;*13 (Suppl. 1): 28-34.
13. Furuta T, El-Omar E.M, Xiao F, Shirai N, Takashima M, Sugimura H. Interleukin 1β polymorphisms increase risk of hypochlorhydria and atrophic gastritis and reduce risk of duodenal ulcer recurrence in Japan. Gastroenterology 2002; 123: 92-105.
14. FurutaT, DelchierJC. *Helicobacter pylori* and Nonmalignant Diseases. Helicobacter 2009*;*14 (Suppl. 1): 29-35.
15. Goodwin CS, Armstrong JA., Chilvers T, Peter M., Collins M.D, Sly L, McConnell W, Harper WES. Transfer of *Campylobacter pylori* and *Campylobacter mustelae* to *Helicobacter* gen. nov. as *Helicobacter pylori* comb. nov. and *Helicobacter mustelae* comb. nov., respectively. *Int J Syst Bacteriol* 1989; 39: 397-405.
16. Kaise M, Yamasaki ., Yonezawa J, Miwa J, Ohta Y, Tajiri H. CpG island hypermethylation of tumoursuppressor genes in *H. pylori* infected non-neoplastic gastric mucosa is linked with gastric cancer risk. Helicobacter. 2008*;*13: 35-41.
17. Karlsson A, Ryberg A, Dehnoei MN, Borch K, Monstein HJ. Association between cagA and vacA genotypes and pathogenesis in a Helicobacter pylori infected population from South-eastern Sweden. BMC Microbiol 2012;12:129.
18. Kullberg MC, Jankovic D, Feng CG, Hue S, Gorelick PL, McKenzie BS, Cua DJ, Powrie F, Cheever AW, Maloy KJ, Sher A. IL-23 plays a key role in *Helicobacter hepaticus*–induced T cell–dependent colitis. J Exp Med 2006; 203(11): 2485–94.
19. Kusters JG, van Vliet AHM, Kuipers EJ. Pathogenesis of *Helicobacter pylori* infection. Clin. Microbiol. Rev 2006*;* 19(3): 449-90.
20. Marie MA. Relationship between *Helicobacter pylori* virulence genes and clinical outcomes in Saudi patients. J Korean Med Sci 2012; 27(2):190-3**.**
21. Marshall BJ, Warren JR. Unidentified curved bacilli in the stomach of patients with gastritis and peptic ulceration. Lancet 1984*;* 1: 1311-15.

22. Matharu KS, Mizoguchi E, Cotoner CA, Nguyen DD, Mingle B, Iweala OI, McBee ME, Stefka AT, Prioult G, Haigis KM, Bhan AK, Snapper SB, Murakami H, Schauer DB, Reinecker HC, Mizoguchi A, Nagler CR. Toll-like receptor 4-mediated regulation of spontaneous Helicobacter-dependent colitis in IL-10-deficient mice. Gastroenterology 2009 ;137(4):1380-90.
23. McCaskey SJ, Rondini EA, Clinthorne JF, Langohr IM, Gardner EM, Fenton JI. Increased presence of effector lymphocytes during *Helicobacter hepaticus*-induced colitis. World J Gastroenterol 2012; 18(13):1459-69.
24. Minohara Y, Boyd DK, Hawkins HK, Ernst PB, Patel J, Crowe SE. The effect of the *cag* pathogenicity island on binding of *Helicobacter pylori* to gastric epithelial cells and the subsequent induction of apoptosis. Helicobacter 2007; 12: 583-90.
25. *Moyaert H, Franceschi F, Roccarina D, Ducatelle R, Haesebrouck F, Gasbarrini A.* Extragastric manifestations of *Helicobacter pylori* infection: other *Helicobacters.* Helicobacter 2008; 13(Suppl. 1): 47-57.
26. O'Rourke JL, Grehan M, Lee A. Non-pylori helicobacter species in humans. Gut 2001; 49: 601-6.
27. Owen RJ. *Helicobacter*--species classification and identification. British Medical Bulletin 1998; 54 (1): 17-30.
28. Parsonnet J, Isaacson PG. Bacterial Infection and MALT Lymphoma. N Engl J Med 2004; 350(3): 213-5.
29. Rhead JL, Letley DP, Mohammadi M, Hussein N, Mohagheghi MA, Eshagh Hosseini M, Atherton JC. .A new *Helicobacter pylori* vacuolating cytotoxin determinant, the intermediate region, is associated with gastric cancer. Gastroenterology 2007*;* 133: 926-36.
30. Saldanha G, Ghura V, Potter L, FletcherA. Nuclear β-catenin in basal cell carcinoma correlates with increased proliferation. Br J Dermatol 2004*;* 151(1):157-64.
31. Sasaki M, Klapproth JM. The role of bacteria in the pathogenesis of ulcerative colitis. J Signal Transduct 2012; 2012:704953.
32. Snider JL, Allison C, Bellaire B, FerreroRL, Cardelli JA. The β1-integrin activates JNK independent of CagA, and JNK activation is required for *Helicobacter pylori* CagA+ induced motility of gastric cancer cells. J Biol Chem 2008*;* 283: 13952-63.
33. Solnick JV, Vandamme P. Taxonomy of the *Helicobacter* Genus. In: *Helicobacter pylori*: Physiology and Genetics (Eds. H.L.T. Mobley, G.L. Mendz, and S.L. Hazell). ASM Press, Washington (DC) 2001. Available from: URL: http://www.ncbi.nlm.nih.gov/books/NBK2463/
34. Wadström T, Ljungh AA. Chronic *Helicobacter* infection of the human liver and bile are common and may trigger autoimmune disease Curr Gastroenterol Rep 2002; 4(5):349-50.
35. Wang X, Goode E. Fredericksen ZS. Association of genetic variation in genes implicated in the β-catenin destruction complex with risk of breast cancer. Cancer Epidemiol Biomarkers Prev 2008*;* 17 (8): 2101-8.
36. Zhang H, Chang DC, Lan CH, Luo YH. *Helicobacter pylori* infection induces apoptosis in gastric cancer cells through the mitochondrial pathway. J Gastroenterol Hepatol 2007*;* 22:1051-6.

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2. MIKROBIOLOŠKI, EPIDEMIOLOŠKI I KLINIČKI ASPEKTI LAJM BORELIOZE

2. MICROBIOLOGICAL, EPIDEMIOLOGICAL AND CLINICAL ASPECTS OF LYME BORRELIOSIS

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Abstract

Lyme borreliosis is multisystem zoonosis caused by spirochaetes of the *Borrelia burgdorferi* sensu lato species complex. The most common clinical manifestation is erythema migrans. However, the infecting pathogen can spread to other tissues and organs, causing more severe manifestations that can involve a patient's skin, nervous system, joints, or heart. Diagnosis of Lyme borreliosis is usually based on the recognition of a characteristic clinical presentation, exposure in an endemic area, and a positive antibody response to *Borrelia burgdorferi*. Serologic and microbiologic tests are available to assist when suspicion of illness exists but a clinical diagnosis cannot be made. The interpretation of serological test results must always be performed in context with the clinical data.

Key words: Lyme borreliosis, clinical manifestations, microbiological diagnosis

Lyme borreliosis is the most commonly reported tick-borne infection in Europe and North America caused by spirochaetes of the *Borrelia burgdorferi* sensu lato species complex. *Borrelia burgdorferi* sensu stricto is the only species known to cause human disease in North America. In Europe, at least five species of Lyme borrelia (*Borrelia afzelii*, *Borrelia garinii*, *Borrelia burgdorferi*, *Borrelia spielmanii*, and *Borrelia bavariensis*) can cause the disease[1]. *Borrelia burgdorferi* seems to be the most arthritogenic, *Borrelia afzelii* is mostly associated with skin manifestations, and *Borrelia garinii* seems to be the most neurotropic[1,2].

Ixodes scapularis and *Ixodes pacificus* are the main vectors of Lyme borrelia in USA, whereas *Ixodes ricinus* is the main vector in Europe[1]. When an infected tick takes a blood meal, Lyme borrelia carried in the midgut increase in number, and undergo phenotypic changes including the expression of outer surface protein C (OspC), which allows them to invade the host. Transmission occurs via the salivary secretions of ticks that have usually been attached and fed for more than 24-36 hours[3]. Primarily, an infected tick deposits spirochaetes into the skin of a host. Later, Lyme borrelia disseminate from that site through blood or perhaps tissue planes to other locations. Virulence factors that cause persistence include the spirochaete's ability to downregulate expression of specific immunogenic surface-exposed proteins, including OspC, and to alter a surface lipoprotein known as variable major protein-like sequence expressed (VlsE)[1]. OspC during and soon after transmission may be essential for early infection. VlsE can randomly recombine to produce a remarkable amount of antigenic variation that promotes resistance against humoral immunity and persistence of infection[2]. Most tissue damage seems to result from host inflamatory reactions.

Lyme borreliosis is multisystem zoonosis with variable clinical presentations at different stages of infection. Localised infection is typically manifested by erythema migrans skin lesion, which eventually resolves, even without antibiotic treatment. However, Lyme borrelia can spread to other tissues and organs, causing more severe manifestations that can involve a patient's skin, nervous system, joints, or heart. Early disseminated disease is usually characterised by two or more erythema migrans skin lesions or as an objective manifestation of Lyme neuroborreliosis, Lyme arthritis or Lyme carditis. More than one erythema migrans skin lesion may be seen in approximately 10% patients with primary Lyme disease[3]. Borrelial lymphocytoma, a painless bluish-red nodule or plaque, usually found on the ear lobe, ear helix, nipple or scrotum is rare and occurs more frequently in children[4]. Early Lyme neuroborreliosis usually develops within a few weeks of infection. In adults, the disease typically presents as painful meningoradiculoneuritis (Garin-Bujadoux-Bannwarth syndrome) and unilateral or bilateral facial palsy[4]. Lyme arthritis usually manifests in one or a few large joints most commonly the knee. Lyme arthritis is one of the rare inflammatory joint diseases in which routine laboratory parameters of inflammation, such as ESR and CRP are often normal. The most common cardiac manifestation of Lyme borreliosis is first-degree atrioventricular (AV) block. Second degree and complete AV blocks, junctional rhythms, and asystolic pauses may be seen[2]. Ophthalmic changes (uveitis, papillitis, keratitis, and episcleritis) are apparently rare and usually present as conjunctivitis in the course of early manifestations of Lyme borreliosis[4]. Late Lyme borreliosis usually manifests as arthritis or the skin disorder known as acrodermatitis chronica atrophicans (almost exclusively seen in adults, predominantly women), but can also include specific rare neurological manifestations[1]. In one case series of patients with Lyme borreliosis, 89% had erythema migrans by itself, 5% had arthritis, 3% had early neurological manifestations, 2% had borrelial lymphocytoma, 1% had acrodermatitis chronica atrophicans, and less than 1% had cardiac manifestations[1].

Pregnant women with Lyme borreliosis have typical manifestations, with erythema migrans, fatigue, constitutional symptoms, and possibly arthritis or neurologic involvement. Transplacental transmission of *B. burgdorferi* has been documented, but it is unclear whether transmission has any effect on malformation or fetal demise[2]. In general, the clinical characteristics of childhood and adult Lyme borreliosis are similar, except for meningopolyradiculoneuritis and acrodermatitis chronica atrophicans, which manifestations are not typically seen in children. There is also evidence indicating that children experience shorter-lasting symptoms and have better outcomes[5].

Most cases of Lyme disease resolve without complication after appropriate antibiotic therapy. In rare cases, when the diagnosis of Lyme neuroborreliosis is made late in the course of disease, recovery from severe neurological symptoms may be incomplete (i.e. paresis, hearing deficits, ataxia, incontinence, cognitive impairment)[4]. However, 10–15% of ideally treated patients develop post-treatment Lyme disease syndrome (PTLDS), which is characterized by the persistence of a complex of symptoms for more than 6 months after treatment. The symptoms are nonspecific and include reduced performance, increased fatigue, musculoskeletal pain, irritability, emotional lability, and disturbances in sleep, concentration, and memory[6]. Patients with PTLDS may have a heightened, but apparently non-specific production of antibodies to neural antigens. These antibodies may either be indicative of past injury to the nervous system during the active phase of the Lyme disease infection, resulting in the immune system being exposed to and activated by novel self antigens, or point to the enhanced B cell mitogenic effect of the borrelia pathogen in cases of delayed treatment and prolonged infection in genetically predisposed individuals[7].

Diagnosis of Lyme borreliosis is usually based on the recognition of a characteristic clinical presentation, exposure in an endemic area, and a positive antibody response to *Borrelia*

burgdorferi[3]. Except in cases with the pathognomonic clinical manifestation erythema migrans, the diagnosis of Lyme borreliosis usually requires confirmation by means of a microbiological diagnostic assay. Antibody detection methods are mainly used for this purpose whereas detection of the causative agent by culture isolation and nucleic acid techniques is confined to special situations, such as to clarify clinically and serologically ambiguous findings. Centers for Disease Control and Prevention (CDC) and the German Society for Hygiene and Microbiology (DGHM) have made similar recommendations for the microbiological diagnosis of Lyme borreliosis in both the United States and Europe[1,4,8,9,10]. For non-erythema migrans presentations of Lyme borreliosis, the mainstay of laboratory diagnosis is two-tier serological testing. One should proceed with an initial screening assay consisting of either an enzyme-linked immunosorbent assay (ELISA) or an indirect fluorescent antibody (IFA) test. Ambivalent or positive results should be followed by a more specific Western blot. The presence of several pathogenic genospecies in Europe with variability of immunodominant antigens, together with the slightly lower specificity of the single test approach, may limit successful application of such single tests. Laboratory kits for the ELISA have traditionally assessed the antibody response to whole-cell *Borrelia*, but newer assays can use purified surface antigens or recombinant antigens known to be highly conserved in pathogenic variants. Synthetic peptide antigens of VlsE or of C6, a single peptide created from an invariable sequence in the gene for VlsE, have reduced the potential for cross-reactivity, and have been suggested for potential use in a one-tiered ELISA[11]. Western blot is generally more sensitive and specific than ELISA in detecting antiborrelial antibodies. Commercial recombinant antigen immunoblots are better standardized than conventional blots.

Serology is insensitive during the first several weeks of infection, with only 30% of patients with erythema migrans having a positive response to IgM. Furthermore, seroconversion in such patients may be absent because early antibiotic treatment can ablate antibody production[3]. Patients with multiple erythema migrans lesions are more likely to be seropositive than those with localized infection because of the greater contact of the pathogen with the immune system and the engagement of a larger number and variety of antigen-presenting cells in patients with multiple lesions, larger antigen loads in these patients, differences in the virulence of the infecting strains of *B. burgdorferi*, or a combination of factors[12]. At present, detection rates for serum antiborrelial antibodies are 20–50% in localized and 70–90% in disseminated early disease. Six weeks or more after the onset of symptoms, 100% of patients with acute neuroborreliosis are seropositive[8]. In cases with late disease (acrodermatis and arthritis), IgG antibodies are detectable in all patients tested.

IgM antibodies are usually positive 2 to 6 weeks after exposure, while 3 to 4 weeks after increasing IgG titers may be detected. IgM antibodies to a limited number of surface proteins: p21 (OspC), p35, p37 and p41 are produced in the early stages of Lyme borreliosis. OspC and p41 are immunodominant while OspC is highly specific for the IgM response. IgG antibodies are initially created to OspC, p37 and p41, then to p39, p58 in the early stages of dissemination, and finally to a large number of antigens (p100, p18, p39 and/or VlsE) in the late stage of the disease. VlsE is early marker of IgG response, but it may be part of immune response of late Lyme borreliosis associated with p100/or p18.

IgM response may persist in cases of prolonged illness or reinfection, but can also be seen in asymptomatic patients previously treated for Lyme borreliosis. Repeated findings of an isolated IgM response with no IgG seroconversion are nonspecific. Thus, a positive IgM test without a positive IgG test is not diagnostic for late disease manifestations. An exception may be a patient who receives inadequate antibiotic therapy for early disease, but sufficient drug to abrogate the IgM to IgG class switch, or a very short duration of clinical symptoms[8]. Once

IgG seroconversion is apparent, levels may stabilize and persist, creating an “immunologic scar” that indicates exposure, but not necessarily active disease. A negative IgG test may provide assistance in ruling out potential late Lyme borreliosis. After antibiotic treatment, antibody titers decline slowly, but IgG and even IgM response may persist for months or even years after treatment[3]. Clearly, a positive serological test does not mean that patient necessarily has active Lyme borreliosis. As serological findings vary considerably and antibodies may persist for a long time in successfully treated individuals, serological follow-up is not suitable for determining whether further antibiotic therapy is warranted. The interpretation of serological test results must always be performed in context with the clinical data.

Antiborrelial antibodies can frequently be found in the CSF of patients with Lyme neuroborreliosis, especially in Europe. Intrathecal synthesis of specific antibodies is a mainstay of the diagnosis of Lyme neuroborreliosis[1]. ELISA and Western blot can be used to identify antiborrelial antibodies in the CSF . The analysis of paired serum and CSF samples obtained simultaneously is key to determining the specific CSF/serum antibody index (AI). A positive AI together with typical signs of inflammation in the CSF confirms a clinical diagnosis of Lyme neuroborreliosis[4]. The CSF/serum index may be positive in some cases when serum antibody tests are negative or equivocal, especially if the patient’s illness has been of short duration[8]. However, intrathecal synthesis of antibodies can persist for several months to several years after successful antibiotic treatment.

Although erythema migrans will eventually resolve without antibiotic treatment, oral antibiotic treatment is recommended to prevent dissemination and development of later sequelae. Even without antibiotic therapy, our innate and adaptive immune response will control widely disseminated infection and generalized systemic symptoms wane within several weeks to months. However, without effective antibiotic therapy, spirochetes may survive in localized niches for several more years[3]. Treatment recommendations include oral antibiotics for early, uncomplicated disease and intravenous antibiotics for disseminated, late stage disease[3,13]. Doxycycline is preferred, but its use should be avoided in pregnant patients and children under 8 years of age. In children under 8 years of age with early disease, an excellent approach is oral amoxicillin. Acute disseminated disease with neurologic involvement generally requires more intensive treatment with intravenous antibiotics. Patients who develop third-degree atrioventricular block should be placed on a cardiac monitor and treated in the same way as acute neuroborreliosis. Patients with recurrent rheumatologic symptoms after the initial treatment may require repeat treatment with 4 weeks of oral antibiotics or 2 to 4 weeks of intravenous ceftriaxon[13]. Positive treatment effects of ceftriaxone in patients with PTLDS reveals that retreatment can be beneficial[14].

In many European countries, the incidence of Lyme borreliosis has increased in the past few years[1]. Most transmission to human beings, manifested by cases of erythema migrans, occurs from late May to late September, coinciding with the activity of nymphs and with the increasing recreational use of tick habitats by the public. Only about 50% of adults and 90% of children may display erythema migrans[2]. Most children with Lyme borreliosis are male, while a majority of adults diagnosed are female. The seasonal distribution of extracutaneous manifestations is less pronounced, because the time from infection until disease onset is variable and usually longer than it is for erythema migrans. In the USA, there is a bimodal age distribution with the highest incidences in children 5–9 years old and in adults 45–59 years old, but patients of all ages are at risk[1]. Lyme borreliosis can be prevented by avoidance of tick infested environments, and when in such environments, covering bare skin and using of tick repellents on skin or clothing. WHO and CDC recommend prompt forceps tick removal

without rotation, chemical adjuvants, or cryotherapy[13]. After removal, the site of previous attachment should be disinfected with soap and warm water.

REFERENCES:

1. Stanek G , Wormser GP, Gray J, Strle F. Lyme borreliosis. *Lancet* 2012; 379(9814): 461–73.
2. Bhate C, Schwartz RA. Lyme disease : Advances and perspectives. Part I. *J Am Acad Dermatol* 2011; 64(4): 619–36.
3. Alao OR , Decker CF. Lyme Disease. *Dis Mon* 2012; 58(6): 335-45.
4. Stanek G, Fingerle V, Hunfeld KP, Jaulhac B, Kaiser R, Krause A, Kristoferitsch W, O'Connell S, Ornstein K, Strle F, Gray J. Lyme borreliosis: Clinical case definitions for diagnosis and management in Europe. *Clin Microbiol Infect* 2011; 17(1): 69–79.
5. Esposito S, Bosis S, Sabatini C, Tagliaferri L, Principi N. Borrelia burgdorferi infection and Lyme disease in children. *International Journal of Infectious Diseases* 2013; 17: 153–8.
6. Aucott JN, Crowder L A, Kortte KB. Development of a foundation for a case definition of post-treatment Lyme disease Syndrom. *International Journal of Infectious Diseases* 2013;17: 443–9.
7. Chandra A, Wormser GP, Klempner MS, Trevino RP, Crow MK, Latov N, Alaedini A. Anti-neural antibody reactivity in patients with a history of Lyme borreliosis and persistent symptoms. *Brain Behav Immun*2010; 24(6): 1018–1024.
8. Wilske B, Fingerle V, Schulte-Spechtel U. Microbiological and serological diagnosis of Lymeborreliosis. *FEMS Immunol Med Microbiol* 2007;49: 13–21.
9. Brouqui P, Bacellar F, Baranton G, Birtles RJ, Bjoersdorff A, Blanco JR, Caruso G, Cinco M, Fournier PE, Francavilla E, Jensenius M, Kazar J, Laferl H, Lakos A, Furlan SL, Maurin M, Oteo JA, Parola P, Perez-Eid C, Peter O, Postic D, Raoult D, Tellez A, Tselentis Y, Wilske B. Guidelines for the diagnosis of tick-borne bacterial diseases in Europe. *Clin Microbiol Infect* 2004;10: 1108–32.
10. Lindgren E, Jaenson TGT. Lyme borreliosis in Europe: influences of climate and climate change, epidemiology, ecology and adaptation measures. *World Health Organization* 2006: 1-35.
11. Ledue TB, Collins MF,Young J, Schriefer ME. Evaluation of the Recombinant VlsE-Based Liaison Chemiluminescence Immunoassay for Detection of *Borrelia burgdorferi* and Diagnosis of Lyme Disease. *Clin Vaccine Immunol* 2008; 15(12): 1796–1804.
12. Wormser GP, Nowakowski J, Nadelman RB, Visintainer P,Levin A,Aguero-Rosenfeld ME. Impact of Clinical Variables on *Borrelia burgdorferi* - Specific Antibody Seropositivity in Acute-Phase Sera from Patients in North America with Culture-Confirmed Early Lyme Disease. *Clin Vaccine Immunol* 2008;15(10): 1519–22.
13. Bhate C, Schwartz RA. Lyme disease : Management and prevention. Part II. *J Am Acad Dermatol* 2011; 64(4): 639–53.
14. DeLong AK, Blossom B, Maloney EL, Phillips SE. Antibiotic retreatment of Lyme disease in patients with persistent symptoms: A biostatistical review of randomized, placebo-controlled, clinical trials. *Contemporary Clinical Trials* 2012;33: 1132–42.

3. POVEĆANJE REZISTENCIJE *HELICOBACTER PYLORI:* TERAPIJSKI PRISTUP

3. TREATMENT OF *HELICOBACTER PYLORI* INFECTION IN THE ERA OF INCREASING ANTIBIOTIC RESISTANCE

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The discovery of *Helicobacter pylori* (*H. pylori*) and its role in most diseases of the upper gastrointestinal tract constituted a breakthrough in the field of gastroenterology. Eradication of *H. pylori* reduces the risc of peptic ulcer recurrence, prevents the development of both ulcers and gastric cancer and benefits around 8% of patients with non-ulcer dyspepsia. However, the most commonly recommended empiric first line treatment with a proton pump inhibitor, amoxicillin and clarithromycin is now compromised due to increase in *H. pylori* antimcrobial resistance. In most European countries, the high rate of primary clarythromycin resistance (20% or more) no longer allows its empirical use. As an alternative to clarythromycin, the empirical use of levofloxacin has been proposed a decade ago, but the prevalence of resistance of *H. pylori* to quinolones has increased rapidly. Although highly prevalent, metronidazole resistance has only limited impact on the eradication rate and can be overcome *in vivo* by increasing the length of treatment or by bismuth-containing quadruple therapy.

According to the Maastricht consensus/Florence IV report surveillance of primary *H. pylori* antibiotic resistance in order to guide clinicians in the therapeutic choice is recommended. Based on these recommendations, clarithromycin should be avoided without prior antibiotic susceptibility testing if local resistance exceeds 15–20%. Also, current guidelines advocate culture and antimicrobial sensitivity testing in patients who remain infected with *H. pylori* after two failed eradication attempts. *Real-time* PCR to detect point mutations conferring resistance to clarythromycin, levofloxacin and tetracycline is rapid and accurate alternative to technically demanding *H. pylori* culture, for both diagnosis and genetic detection of antibiotic resistance in *H. pylori*.

In R. Serbia, until recently there were no antibiotic sensitivity data of *H. pylori* isolates. The need for local national resistance surveys is essential to overcome the acquisition of antibiotic resistance in *H. pylori*.

Key words: *Helicobacter pylori*, antibiotic resistance, local national resistance surveys

Helicobacter pylori (*H. pylori*) plays an essential role in the pathogenesis of chronic active gastritis in the human stomach, peptic ulcer, gastric adenocarcinoma and lymphomas associated with mucosas (MALT) (1-4). All actual consensus guidelines recommend eradication of *H. pylori* in symptomatic patients (5, 6). Overwhelming evidence indicates that eradication of *H. pylori* prevents the development of peptic ulcer ddisease and reduces the risc of peptic ulcer recurrence. There is also evidence supporting the merits of *H. pylori* eradication in patients with atrophic gastritis, intestinal metaplasia, gastric adenocarcinoma and first-degree relatives of patients with gastric cancer. In addition, there is benefit in patients with some extra-gastric diseases such as iron deficiency anaemia, B12 deficiency and

idiopathic thrombocytopenic purpura. *H. pylori* eradication may be appropriate for patients with investigated functional dyspepsia in populations with a prevalence of *H. pylori* greater than 20% and without alarming signs or symptoms (7).

Recently proposed "test-and-treat" strategies, based on the non-invasive diagnosis of *H. pylori* infection, is recommended in populations of dyspeptic patients with a moderate-to-high prevalence of *H. pylori* infection (≥10–20%), whereas the empirical proton pump inhibitor (PPI) strategy may be preferable in low-prevalence populations (8).

Over recent decades, as a result of treatment, *H. pylori* - related peptic ulcer disease and prevalence of *H. pylori* infection have progressively declined throughout most of the industrialized countries (9). However, an excellent eradication rate (>95%) has not been attained in the numerous therapeutic strategies studied so far and a gradual increase in failure of HP eradication treatments is observed (10). Success of *H. pylori* eradication with conventional treatment (PPI, amoxicillin and clarithromycin) has become progressively less efficacious. Among several host factors that could explain the particular difficulty in eradicating *H. pylori* are non-compliance to therapy, gastric acid hypersecretion, genetic polymorphism of CYP 2C19 and underlined gastrouduodenal disease (11,12). Indeed, it was found that patients without ulcer disease carry more resistant clarithromycin and levofloxacin strains than patients with an endoscopic finding of ulcer disease (13). Primary resistance to antibiotics is the main bacterial factor that affects the treatment success, but also, there are: high bacterial load in the stomach that promotes an inoculums effect, bacterial coccoid forms of *H. pylori*, genetic variability (negative *cag*A status, s2m2 *vac*A allele status), intra-cellular location of bacteria and high rates of reinfection in developing countries (11,12). Other risk factors associated with *H. pylori* resistance are the formation of a bacterial bio-film and the presence of persistent or inactive cells highly tolerant to the presence of antibiotics (14). That is why susceptibility to an antibiotic does not guarantee the complete eradication of the bacteria (15). Recently it has been proposed the addition of antibiofilm substances with N-acetyl cysteine to treatment could potentially improve efficacy of treatment regimens (10).

Almost twenty years after the establishment of clarithromycin based – triple therapy, nowadays, fall in the eradication success from over 90% in the 1990s to <60% is observed (11). In particular, clarithromycin resistance has a major negative impact of the efficacy of the recommended first line triple therapy and when *H. pylori* strain is resistant the eradication rates decreases by 35–60%. Consequently, a progressive increase in the prevalence of resistance to this antibiotic may limit its empiric use. In the novel European multicentre study from 32 centres in 18 Europe countries the prevalence of primary antibiotic resistance of *H. pylori* among outpatients was examined (16). For adults, resistance rate was over 17% for clarithromycin, over 14% for levofloxacin and almost 35% for metronidazole, while the prevalence was around 1% for the amoxicillin, tetracycline and rifabutin (16). Furthermore, resistance rate to clarithromycin and levofloxacin was significantly higher in countries from West/Central and Southern Europe (>20%) than in Northern Europe (>10%). In comparison with a similar survey (17), the almost the doubling of the prevalence of clarithromycin resistance over the past ten years (from 9.8% to 17.5%) was found. This steady increase in clarithromycin resistance of *H. pylori* could have been anticipated given the long-lasting character of *H. pylori* infection when left untreated and the genetic basis of this resistance, that is, point mutations in the 23S rRNA gene which are transmited vertically (9). There are essentially three point mutations conferring resistance to clarithromycin which can occur at the two nucleotide positions of the 23S rRNA gene: transition A to G on position 2142 or 2143, and transversion A to C on position 2142, that could be easily detected by *Real time* - PCR. Selection for these resistant mutants occurs when a macrolide is prescribed, which

impairs first line treatment, since only efficient remaining drug is amoxicillin or metronidazole.

As an alternative to clarithromycin, the empirical use of levofloxacin with amoxicillin and a PPI for ten days has been proposed a decade ago. But, the success rate of this rescue regime is also very much depended on the level of levofloxacin resistance which, also, increase very quickly (16). In contrast, metronidazole resistance remains at the same high level as ten years ago. Although highly prevalent, metronidazole resistance has only limited impact on the eradication rate and can be partly overcome *in vivo* by increasing the length of treatment or by bismuth-containing quadruple therapy with metronidazole (9).

Nowadays, bismuth-based quadruple therapy (bismuth, tetracycline, metronidazole plus a PPI) appears to provide the rationale for empiric first-line use, since clarythromycin and levofloxacin have been avoided (9). Moreover, no resistance to bismuth salts has been described. Additionally, clinical impact of metronidazole resistance can be overcome by increasing the dose and duration of treatment. As regarding tetracycline, resistance to this antibiotic is rarely encountered because three adjacent point mutations are required and the change in the nucleotide triplet ($AGA_{926-928}$ to TTC) is extremely low in the same microorganism (9).

Alternative recent approach, sequential therapy (PPI and amoxicillin in the first phase followed by PPI, clarithromycin and metronidazole in the second phase) has been attempted to increase the eradication rate. The challenge of *H. pylori* clarithromycin resistance can be minimized when drugs are prescribed sequentially instead of concomitantly. The usage of amoxicilin and PPI in the first phase of this regimen for five days decreases the bacterial load eliminating most, if not all, of clarithromycin resistant mutants. Then, in the second phase, the next five days administration of drugs, allows eradication of remaining viable microorganisms. It was showed that when clarythromycin resistance strains were present efficiency was better with sequential therapy (72%) than with standard therapy (33%) (18).

Since resistance for two major classes of antibiotics for treatment of *H. pylori* infection, quinolones and macrolides, is positively correlated with widespread use of these drugs in the outpatient community for infectious diseases other than *H. pylori* infection (16), the use of standard triple therapy has been recommended only in those areas where clarithromycin resistance is lower than 15–20% (5). Following Maastricht consensus/Florence IV report on the management of *H. pylori* susceptibility to clarithromycin should be tested or clarithromycin should not be used, if local resistance to clarithromycin is above 15–20% (5). Also, after two failed eradication attempts, current guidelines advocate antibiotic susceptibility testing. The standard methods using culture and antibiotic susceptibility testing (e.g. Epsilometer test, E□test) should be performed in specialist laboratories, as the procedure is labor-intensive and time consuming. Molecular based methods (e.g. *Real-time* polymerase chain reaction (PCR) - based assays) to detect point mutations predictive of clarithromycin, levofloxacin and tetracycline resistance are rapid and accurate alternative to *H. pylori* culture, for both diagnosis and genetic detection of antibiotic resistance in *H. pylori*. They are, unlike culture based methods, independent of cell viability, growth rate of bacteria, do not require specific transport conditions and are easy to perform.

This culture and susceptibility testing for *H. pylori* approach is logical because even in the areas with high clarithromycin resistance the majority of patients could benefit from the standard triple therapy which is still considered the “gold standard” for *H. pylori* eradication (9). Culture and susceptibility testing for *H. pylori* are not commonly performed in routine practice and only a few microbiological laboratories routinely offer isolation of *H. pylori* (7). The emergence of multi-resistant strains of *H. pylori*, particularly seen in patients failing

previous treatment, urges the antimicrobial susceptibility testing, thereby allowing antibiogram - adapted eradication. The duration of incubation for the isolation of *H. pylori* has been recommended to be five to ten days in a microaerobic atmosphere. As culture is important in studying the profile of the antibiotic sensitivity of the isolate for the treatment of infections caused by *H. pylori*, a prolonged incubation time to obtain a higher isolation rate for *H. pylori* from clinical samples is suggested (19).

Limited number of point mutations conferring clarithromycin resistance allows the development of PCR based methods, which can be applied on *H. pylori* isolates or directly on gastric biopsy specimens. Resistance to quinolones is caused by point mutations in the so-called quinolone resistance-determining region (QRDR) of the *gyr*A gene (9). But, genotypic resistance to levofloxacin (*gyr*A mutations) do not always correlate well with phenotypic resistance, suggesting alternative mechanisms of resistance, or efflux system. Stable primary *H. pylori* resistance to amoxicillin, with a MIC of 8 mg/L, is very rare and occurs due to mutations in the *pbp*-1A gene (9). The need for triple mutations of 16S rRNA gene may explain the rarity of tetracycline resistance. Large panels of alterations within *rdx*A gene are of prime importance, but the exact mechanisms of resistance to metronidazole in *H. pylori* yet to be discovered in order to develop molecular approaches. So, until all genes involved in mutations would be identified, culture continues to be the "gold standard" allowing susceptibility in *H. pylori*.

In R. Serbia, susceptibility testing was performed for the first time in National Reference Laboratory for *Campylobacter* and *Helicobacter*, Center for microbiology, at Public Health Institute, Niš, Serbia, on clinical isolates of *H. pylori* obtained from gastric biopsy specimens of hospitalised patients with dyspepsia who had not been previously treated (20). Primary *H. pylori* resistance to metronidazole is considerable (37.5%), and that to clarithromycin is higher than that in western Europe. There were no strains resistant to amoxicillin, tetracycline or rifabutin.

The need for local national resistance surveys is essential to improve the effectiveness of current anti-*H.pylori* treatment regimens. The acquisition of antibiotic resistance can be, at least partially, overcome by continuous testing and monitoring the drug resistance of *H. pylori* strains before applying the treatment. Antimicrobial susceptibility testing should be performed particularly in patients previously treated unsuccessfully, due to increasing dual resistance to metronidazole and clarithromycin, thereby allowing tailored therapy that could optimize eradication regimens within the different countries.

References:

1. Graham DY, Shiotani A. New concepts of resistance in the treatment of *Helicobacter pylori* infections. *Nat ClinPract Gastroenterol Hepatol* 2008; 5: 321–31.
2. Blaser M. *Helicobacter pylori* and esophageal disease: wake-up call? *Gastroenterology* 2010; 139: 1819–22.
3. Andersen L, Rasmussen L. Minireview *Helicobacter pylori* and coccoid forms and biofilm formation. *FEMS ImmunolMed Microbiol* 2009; 56: 112–5.
4. Stenstrom B, Mendis A, Marshall B. The latest in diagnosis and treatment. Australian Family Phisician 2008; 8 (37): 608-612.
5. Malfertheiner P, Mégraud F, O'Morain C, Atherton J, Axon AT, Bazzoli F. Management of *Helicobacter pylori* infection - The Maastricht IV/ Florence Consensus Report. Gut 2012; 61: 646-64.
6. Chey WD, Wong B.C. American College of Gastroenterology guideline on the management *Helicobacter pylori* infection. Am J Gastroenterol 2007; 102:1808–1825.

7.McNulty CA1, Lasseter G, Shaw I, Nichols T, D'Arcy S, Lawson AJ, Glocker E. Is Helicobacter pylori antibiotic resistance surveillance needed and how can it be delivered? Aliment Pharmacol Ther. 2012; 35(10):1221-30.
8.Gisbert JP, Calvet X. *Helicobacter pylori* "Test-and-Treat" Strategy for Management of Dyspepsia: A Comprehensive Review. Clin Transl Gastroenterol. 2013; 4:e32.
9.Mégraud F. The challenge of *Helicobacter pylori* resistance to antibiotics: the comeback of bismuth-based quadruple therapy. Therap Adv Gastroenterol. 2012; 5(2): 103–109.
10. Sierra F, Forero M, Rey M, Botero L, Cárdenas A. Pilot Study: Miscellaneous Therapy Is Highly Successful for *Helicobacter pylori* Eradication. Aliment Pharmacol Ther. 2013; 37(12):1165-1171.
11. Graham DY. Therapy of *Helicobacter pylori*: current status and issues. *Gastroenterology* 2012; 118: S2–8.
12. Chuah SK, Tsay FW, Hsu PI, Wu DC. A new look at anti-*Helicobacter pylori* therapy. *World J Gastroenterol* 2011; 17: 3971–5.
13. Rimbara E, Fischbach LA, Graham DY. Optimal therapy for *Helicobacter pylori* infections. *Nat Rev GastroenterolHepatol* 2011; 8: 79–8.
14. Cammarota G, Sanguinetti M, Gallo A, Posteraro B. Review article: biofilm formation by *Helicobacter pylori* as a target for eradication of resistant infection. *Aliment Pharmacol Ther* 2012; 36: 222–30.
15. Gisbert JP. Rescue regimens after *Helicobacter pylori* treatment failure. *World J Gastroenterol* 2008; 14: 5385–402.
16. Mégraud F, Coenen S, Versporten A, Kist M, Lopez-Brea M, Hirshl A. *Helicobacter pylori* resistance to antibiotics in Europe and its relationship to antibiotic consumption.Gut. 2013; 62: 34-42.
17. Glupczynski Y, Mégraud F, Lopez-Brea M. European multicentre survey of in vitro antimicrobial resistance in *Helicobacter pylori.* Eur J Clin Microbiol Infect Dis 2001; 20: 820-3.
18. Gisbert JP, Calvet X, O'Connor, Mégraud F, O'Morain CA. Sequential therapy for *Helicobacter pylori* eradication: a critical. J Clin Gastroenterol. 2010: 313-325.
19. Babić T, Miljković-Selimović B, Kocić B, Nagorni A, Ristić Lj. Successful isolation of *Helicobacter pylori* after prolonged incubation: A case report of prolonged incubation for *H. pylori*. *Arch. Biol. Sci*., Belgrade, 64 (4), 1297-1299, 2012
20. Babic T. Uporedna analiza neinvazivne i invazivnih metoda u dijagnostici Helicobacter pylori infekcije. Doktorska disertacija 2012. Medicinski fakultet Univerziteta u Nišu.

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4. CARBAPENEM-RESISTENT *ENTEROBACTERIACAE*-OCCURRENCE, DETECTION AND SIGNIFICANCE

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ABSTRACT

Bacterial resistance to antimicrobials has been increasing because of the irrational use of antimicrobial drugs. The emergence of resistance to carbapenem in *Enterobacteriaceae* is an important growing threat to public health. Carbapenems (currently ertapenem,imipenem, meropenem and doripenem, etc.) are the most effective and potent β lactam antibiotics, and they are reliably active against multidrug-resistant Gram-negative bacteria including Enterobacteriaceae. Carbapenem-resistant *Enterobacteriaceae* (CRE) was first described in the early 1990s isolation of CRE from clinical specimens has increased at an alarming rate in the recent past. The common mechanisms that are responsible for carbapenem resistance include changes in outer membrane proteins, overexpression of drug efflux pumps and carbapenem hydrolyzing enzymes. The production of carbapenem hydrolyzing enzymes.(carbapenemases) is the most important mechanism. The molecular classification scheme divides a large variety of carbapenemases in *Enterobacteriaceae* into three classes-Ambler class A, B and D based on the amino acid sequences of the proteins. Enterobacteriaceae producing a 'big five' carbapenemases (KPC, OXA-48, IMP, NDM and VIM) are spread worlvide. Suspected Carbapenem resistant bacteria detectied by MIC and disc-diffusion method, should be further explored for carbapenemase production by phenotypical methods. Production of carbapenemase identified by disk approximation test using EDTA as metal chelater. Modified Hodge test can also be used for the same purpose. PCR has been successfully utilized for the detection of single or multiple carbapenemase genes directly from clinical samples. Accurate identification of carbapenemase producers in the clinical laboratory is an important first step in the control of CRE. 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.

Keywords: Carbapenem-resistant; detection; *Enterobacteriaceae*

One of the biggest problems in public health associated with the antibiotic therapy is resistance, especially the emergence of resistance to carbapenem in *Enterobacteriaceae*. The World Health Organization identified antimicrobial resistance as one of the three greatest threats to human health(1).

Enterobacteriaceae are rod-shaped, Gram-negative bacteria that are normal inhabitants of the intestinal flora. They are the source of community- and hospital-acquired infections, causing infections that range from cystitis to pyelonephritis, septicemia, pneumonia, peritonitis, meningitis, and device-associated infections. *Enterobacteriaceae* spread easily between humans by hand carriage as well as contaminated food and water. They also have a propensity to acquire genetic material through horizontal gene transfer, mediated mostly by plasmids and transposons(2) .This combination is why emerging multidrug resistance in *Enterobacteriaceae* is of the utmost importance for clinical therapy.

Carbapenems (imipenem, meropenem, ertapenem, and doripenem) are the latest developed and the most effective β-lactam antibiotics. They are reliably active against Gram-positive and Gram-negative aerobes and anaerobes including multidrug-resistant Gram-negative bacteria. These agents are used as an empiric therapy for the treatment of life threatening infections. Clinical use of these drugs were recently increased following the emergence and dissemination of Extended Spectrum β -Lactamase (ESBL) producers, which were capable to hydrolyze all β-lactams except carbapenems.The inevitable use of carbapenems is consequently bound to exert greater selective pressure and the emergence of carbapenem resistance all over the world (3,4). Carbapenem-resistant *Enterobacteriaceae* (CRE) was first described in the early 1990s (5) . The isolation of CRE occurred sporadically throughout the decade. However, the recovery of CRE from clinical specimens has increased at an alarming rate in the recent past6) .

The common mechanisms that are responsible for carbapenem resistance include reduced expression of outer membrane proteins or overexpression of drug efflux pumps along with the overproduction of β-lactamases possessing weak carbapenemase activity (like ESBL or AmpC enzymes). And production of carbapenem hydrolyzing enzymes.(carbapenemases) as the most important mechanism. The molecular classification scheme divides a large variety of carbapenemases in *Enterobacteriaceae* into three classes- Ambler class A,B and D based on the amino acid sequences of the proteins, whereas functional groups have been assigned based on the hydrolysis and inhibition profiles of the enzymes (7)

A variety of class A carbapenemases have been described; some are chromosome encoded (NmcA, Sme, IMI-1, SFC-1), and others are plasmid encoded (*Klebsiella pneumoniae* carbapenemases [KPC], IMI-2, GES, derivatives), but all effectively hydrolyze carbapenems and are partially inhibited by clavulanic acid KPCs are the most clinically common enzymes in this group. The first KPC producer (KPC-2 in *K. pneumoniae*) was identified in 1996 in the eastern United States Within a few years (8), KPC producers had spread globally and have been described across the contiguous United States (still mostly in eastern coast states) and, in particular, in Puerto Rico, Colombia, Greece, Israel, and the People's Republic of China (9). Outbreaks of KPC producers also have been reported in many European countries and in South America.). A single *K. pneumoniae* clone (sequence type [ST]-258) was identified extensively worldwide, indicating that it may have contributed to the spread of thebla_{KPC} genes.(10). KPC producers are usually multidrug resistant. Death rates attributed to infections with KPC producers are high (>50%) *11* Class B β-lactamases exhibit a broad spectrum of hydrolytic activity including all penicillins, cephalosporins, and carbapenems, with the exception of monobactam aztreonam. Their activity is not inhibited by commercially available β-lactamase inhibitors (clavulanic acid, tazobactam, or sulbactam). Hydrolysis is dependent on the interaction of the β-lactam with Zn^{2+} ion(s) in the active site, explaining the inhibition of their activity by EDTA, a chelator of divalent cations (2,7). Analysis of the bla_{IMP} genetic environments most often revealed features of class 1 integrons. Resistance genes encode decreased susceptibility to unrelated antibiotic molecules (e.g. β-lactams, aminoglycosides, sulfonamides, and chloramphenicol). Class B metallo-β-lactamases

(MBLs) are mostly of the Verona integron–encoded metallo-β-lactamase (VIM) and IMP types and, more recently, of the New Delhi metallo-β-lactamase-1 (NDM-1) type. The first acquired MBL, IMP-1, was reported in *Serratia marcescens* in Japan in 1991(12). Since then, MBLs have been described worldwide. Endemicity of VIM- and IMP-type enzymes has been reported in Greece, Taiwan, and Japan, although outbreaks and single reports of VIM and IMP producers have been reported in many other countries. NDM-1–positive *Enterobacteriaceae* are now the focus of worldwide attention (13,14). Discovered in 2008 in Sweden from an Indian patient hospitalized previously in New Delhi (15). Since mid-August 2010, NDM-1 producers have been identified on all continents except in Central and South America with, in most of the cases, a direct link with the Indian subcontinent. Few cases have been reported from the United States and Canada. Ret findings suggest that the Balkan states and the Middle East may act as secondary reservoirs of NDM-1 producers. Death rates associated with MBL producers range from 18% to 67% (16).

Class D β-lactamases, also named OXAs for 'oxacillinases', possessing some carbapenemase activity. With the exception of one variant (OXA-163) that has a very weak carbapenemase activity, carbapenem-hydrolyzing class D β-lactamases (CHDLs) do not hydrolyze expanded-spectrum cephalosporins. Overall, the carbapenemase activity of CHDLs is weak and is not inhibited by either clavulanic acid or by EDTA (7).OXA-48 has been found only in *Enterobacteriaceae*. The first OXA-48 producer was identified from a *K. pneumoniae* isolate recovered in Turkey in 2003. Since then, OXA-48 producing strains have been extensively reported as sources of nosocomial outbreaks in Turkey, and identified in countries of Southern Europe and Africa.

Although all the resistant mechanisms are being increasingly identified worldwide, there are some clear endemic areas, such as KPC producers in the USA, Greece, and Israel, VIM producers in Greece, OXA producers in North Africa and Turkey, and NDM producers in India. Among the *Enterobacteriaceae* members, *Klebsiella pneumoniae* are the predominant carbapenemase producer followed by *Escherichia coli* –leading cause of hospital acquired and community acquired infections respectively [5].

Detection of carbapenem resistance- the ranges of carbapenem MICs for *Enterobacteriaceae* producing each of the 'big five' carbapenemases (KPC, OXA-48, IMP, NDM and VIM) span from below the susceptible breakpoints to high-level resistance. Nevertheless, the MICs of carbapenems for most carbapenemase-producing bacteria will be above the epidemiological cut-off (ECOFF) values defined by EUCAST even if some isolates are not clinically resistant. Detection of carbapenemaes production based on the following facts: elevated Minimum Inhibitory Concentration (MIC) to carbapenem; the zone diameter around a carbapenem disc indicates non-susceptibility (test a carbapenem against all clinically-significant isolates). Recomanded values from EUCAST are for meropenem and ertapenema MIC≥0,125µg/ml, breakpoint 25mm, for imipenem MIC≥1,0 µg/ml, breakpoint 23mm(17). Ertapenem has the best sensitivity among the available analogues, but poor specificity for carbapenemase producers. Meropenem and imipenem may have better specificity, but reduced sensitivity); colonies are obtained on any commercially-available agar for detecting carbapenem-resistant bacteria; automated systems should flag non-susceptibility to any carbapenem, irrespective of the expert interpretation given. Suspected Carbapenem resistant bacteria detection by MIC method, should be further explored for carbapenemase production by phenotypical methods(18). Production of metallo -beta- lactamase can be identified by disk approximation test (or double disk synergy test) using EDTA as metal chelater. In disk approximation test, clear zone (zone of inhibition) around the beta lactum disk, is increased in the presence of zinc chelator like EDTA. Modified Hodge test can also be used for the same purpose. This is a phenotypic test for confirming the presence of carbapenemase production. Cloverleaf

indentation at the intersection of the test organism and standard strain, within the zone of inhibition of carbapenem disk shows positive result for carbapenemase production. Molecular tests are the only reliable means of detecting production of carbapenemases by an isolate. PCR has been successfully utilized for the detection of single or multiple carbapenemase genes directly from clinical samples. If stool samples or rectal swabs require screening for CPE, the method chosen should have demonstrated performance at least equivalent to plating on to a commercially-prepared chromogenic agar medium specifically recommended for this purpose.

Accurate identification of carbapenemase producers in the clinical laboratory is an important first step in the control of CRE. The early identification of carbapenemase-producing *Enterobacteriaceae* both in clinical infections and at the carrier-state is essential to prevent the development of untreatable infections.Because of the irrational use of antibiotics more and more microorganisms are developing resistance to available antibiotics (19). Resistance in Gram-negative pathogens is increasing at an alarming rate. Because multidrug resistance in Gram-negative bacteria is observed in both nosocomial and community isolates, eradication of these resistant strains is becoming more difficult (20). Infections caused by such bacteria are associated with high morbidity and mortality. Two classes of antibiotics i.e., polymyxins (colistin) and glycylcyclines (tigecyclines), have shown in vitro activity against CRE. 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.

References

1. WHO (2011) Antimicrobial resistance: no action today, no cure tomorrow. World Health Organisation

2. Nordmann P, Dortet L, Poirel L (2012) Carbapenem resistance in *Enterobacteriaceae*: here is the storm! Trends Mol Med 18: 263-272.

3. Pitout JD, Laupland KB (2008) Extended-spectrum beta-lactamase-producing *Enterobacteriaceae*: an emerging public-health concern. Lancet Infect Dis 8: 159-166.

4. Nordmann P, Naas T, Poirel L (2011) Global spread of Carbapenemase-producing *Enterobacteriaceae*. Emerg Infect Dis 17: 1791-1798.

5. Chow JW, Shlaes DM (1991) Imipenem resistance associated with the loss of a 40 kDa outer membrane protein in *Enterobacter aerogenes*. J Antimicrob Chemother 28: 499-504.

6. Nordmann P, Gniadkowski M, Giske CG, Poirel L, Woodford N, et al. (2012) Identification and screening of carbapenemase-producing *Enterobacteriaceae*. Clin Microbiol Infect 18: 432-438.

7. Queenan AM, Bush K. Carbapenemases: the versatile β-lactamases. Clin Microbiol Rev. 2007;20:440–58

8. Yigit H, Queenan AM, Anderson GJ, Domenech-Sanchez A, Biddle JW, Steward CD, Novel carbapenem-hydrolyzing β-lactamase KPC-1 from a carbapenem-resistant strain of *Klebsiella pneumoniae.* Antimicrob Agents Chemother.2001;45:1151–61

9. Nordmann P, Cuzon G, Naas T. The real threat of *Klebsiella pneumoniae* carbapenemase-producing bacteria. Lancet Infect Dis. 2009;9:228–36

10. (Cuzon G, Naas T, Truong H, Villegas MV, Wisell KT, Carmeli Y, Worldwide diversity of *Klebsiella pneumoniae* that produce β-lactamase bla_{KPC-2} gene. Emerg Infect Dis. 2010;16:1349–56.
11. Borer A, Saidel-Odes L, Riesenberg K, Eskira S, Peled N, Nativ R, Attributable mortality rate for carbapenem-resistant *Klebsiella pneumoniae* bacteremia. Infect Control Hosp Epidemiol. 2009;30:972–6. DOIPubMed
12. Ito H, Arakawa Y, Ohsuka S, Wacharotayankun R, Kato N, Ohta M. Plasmid-mediated dissemination of the metallo-β-lactamase gene bla_{IMP} among clinically isolated strains of *Serratia marcescens.* Antimicrob Agents Chemother.1995;39:824–9.PubMed
13. Kumarasamy KK, Toleman MA, Walsh TR, Bagaria J, Butt F, Balakrishnan R, Emerg ence of a new antibiotic resistance mechanism in India, Pakistan, and the UK: a molecular, biological, and epidemiological study. Lancet Infect Dis. 2010;10:597–602
14. Nordmann P, Poirel L, Toleman MA, Walsh TR. Does broad-spectrum β-lactam resistance due to NDM-1 herald the end of the antibiotic era for treatment of infections caused by Gram-negative bacteria? J Antimicrob Chemother.2011;66:689–92. DOIPubMed*17*
15. Yong D, Toleman MA, Giske CG, Cho HS, Sundman K, Lee K, Characterization of a new metallo-β-lactamase gene,bla_{NDM-1}, and a novel erythromycin esterase gene carried on a unique genetic structure in *Klebsiella pneumoniae*sequence type 14 from India. Antimicrob Agents Chemother. 2009;53:5046–54
16. Daikos GL, Petrikkos P, Psichogiou M, Kosmidis C, Vryonis E, Skoutelis A, Prospect ive observational study of the impact of VIM-1 metallo-β-lactamase on the outcome of patients with *Klebsiella pneumoniae* bloodstream infections. Antimicrob Agents Chemother. 2009;53:1868–73
17. http://www.eucast.org/eucast_news/news_singleview/?no_cache=1&tx_ttnews%5Btt_news%5D=54
18. Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing: twentieth information supplement update M100 -S20-U: The Institute; 2010
19. Deshpande LM, Jones RN, Fritsche TR, Sader HS (2006) Occurrence and characterization of carbapenemase-producing *Enterobacteriaceae*: report from the SENTRY Antimicrobial Surveillance Program (2000-2004). Microb Drug Resist 12: 223-230.

20. Hawser SP, Bouchillon SK, Hoban DJ, Badal RE, Hsueh PR, Paterson DL. Emergence of high levels ofextended-spectrum β-lactamase producing gram negative bacilli in the Asia Pacific region: data from treatment of prolonged bacteremia due to a multiresistant VIM -1 and SHV - 12 beta-lactamase- producing Klebsiella pneumoniae epidemic clone. Diagn Microbiol Infect Dis.

ORAL PRESENTATIONS

1. REPORT FROM IMPLEMENTATION OF INNIC MULTIDIMENSION HAND HYGIENE APPROACH (IMHHA) AMONG HEALTH CARE WORKERS (HCWs) IN NEPHROLOGY ICU

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Apropriate hand hygiene before patient contact is a fundamental tool for the prevention of cross-transmited infections. In aim to improve HH among HCWs, IMHHA was implemented from January 2014 in University Clinic for Neprhology in Skopje. An observational, interventional, prospective study was conducted from the same time, and follow up in next six months. The IMHHA includes following elements: administrative support, supplies availability, education and training, reminders in workplaces, process surveillances and performance feedback. Training was provided at the beginig of each month, poster reminders with 5 step-procedure of proper HH were displayed around hospital settings. HH practice was monitored by an observers without awarness of HCWs respecting "Five moments for HH" by WHO (sex, professional category, work shift, type of contact, type of ICU). Study achived 100% administrative support and educated HCWs. According the results study there was a higher compliance, in nurses v.s. medical doctors, an invasive contact v.s. non-invasive contact and morning shift versus afternoon and evening shift. There was no significant difference in compliance in females v.s. males.

2. *LACTOBACILLUS RHAMONSUS* LB-68 AS AN ACTIVE COMPONENT FOR MAKING A NEW VAGINAL TABLET FORMULATION

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Lactobacillus species, as a part of physiological vaginal flora, help to maintain vaginal eco-system balance with numerous mechanisms. Various internal and external factors such as certain conditions and illnesses, inadequate hygiene, antibiotic and hormonal therapies, radio and immunotherapy, spermicide agents' frequent usage can lead to a reduction colony number of of lactobacilli or their complete destruction. Implantation of carefully selected lactobacilli with suitable probiotic properties can establish vaginal microflora balance, reduce risk of infection and protect the human health in a natural way.

Aim of this study is investigation of *Lactobacillus's rhamnosus* LB-68 probiotic properties as an active component for making a new vaginal tablet formulation.

Material and methods: Strain was identified in the reference laboratory in Scotland (NCIMB) using PCR and API 50 CHL set. The experiments performed in the Institute Torlak included the following tests: strain viability test by growing and multiplying on the modified MRS medium, inhibitory effect on pathogenic bacteria and *Candida albicans* using strains from the Institute's collection; antibiotic and spermicide agent (nonoxinol-9) susceptibility test by dilution method; H_2O_2 producing test on the tetramethilbenzidin medium, production of bacteriocin with small molecule mass of 6433.8 Dalton by chromatography; autoaggregation capability adopted as a manifestation of adherence to vaginal epithelial cells by colorimetric measuring and safety test on white mice.

Results: *Lactobacillus rhamnosus* LB-68 demonstrated good viability and adherence ability to vaginal cells, inhibitory effect on the examined bacteria and *Candida albicans*, intermedial susceptibility to the most tested antibiotics, medial susceptibility to nonoxinol-9, bacteriocin's producer and safety for use.

Conclusion: Probiotic properties of the strain *Lactobacillus rhamnosus* LB-68 are suitable as an active component for making new formulation of vaginal tablets.

Key words: *Lactobacillus rhamnosus* , vaginal flora, probiotic

3. IMUNOHEMILUMINISCENTNI TEST I ELISA TEST KAO SKRINING METODE U ISPITIVANJU UZORAKA SERUMA NA PRISUSTVO ANTITELA NA *BORRELIA BURGDORFERI*

3. IMUNOCHEMILUMINISCENCE TEST AND THE ELISA TEST AS A SCREENING METHODS TO TEST SERUM SAMPLES FOR ANTIBODIES TO *BORRELIA BURGDORFERI*

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Objectives: The increasing need for routine laboratory of Lyme borreliosis as effect has development of new techniques. One of these methods is imunochemiluminescence. The purpose of this paper was to investigate the serum samples for antibodies to *Borrelia burgdorferi* in the laboratory of the Department of microbial genetics and immunology, Military Medical Academy**.**

Materials and methods: Imunochemiluminescence LIAISON (DiaSorin), automated system that uses cold light illumination technique and ELISA (Euroimmun), were used for testing 71 samples of serum.

Results: In a small number of samples 33 (46%) we obtained the same results, of which 29 (88%) samples were negative in both the screening tests. In 4 (9%) samples had positive results in the IgM class of antibodies in both assays. In the most of the treated serums 38 (54%) the results were not the same. Of these 31 (82%) of the samples had a negative result in imunochemiluminescence, while the observed positive ELISA reactivity in the IgM or IgG class antibodies.

Conclusion: The results confirm the recommendation that the routine serological diagnostics Lyme borreliosis recommends the use of two different screening tests.

Key words: screening tests, imunochemiluminescence, ELISA, *Borrelia burgdorferi*.

4. DIJAGNOSTIČKA EVALUACIJA GROZNICE ZAPADNOG NILA U SRBIJI U SEZONI 2013. I 2014.GODINE

4. DIAGNOSTIC EVALUATION OF THE WEST NILE FEVER IN SERBIA IN 2013 AND 2014

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In 2012, the first outbreak of WNV disease has occurred in Serbia, with 42 laboratory confirmed cases, followed by large number of patients in season 2013.

Objectives: The aim of this study was to analyze the laboratory data of a West Nile fever in season 2013. In addition, laboratory data from current season were also analyzed.

Materials and Methods: Samples from 534 patients were tested during the season 2013 (from 349 patients serum and CSF were collected and from 185 patients only serum was collected). Samples were tested at National Reference Laboratory for Arboviruses and Hemorrhagic fever, Institute of virology, Vaccines and Sera Torlak, Serbia for the presence of IgM and IgG antibodies using commercial ELISA (Euroimmun, Lubeck, Germany).

Samples of 186 patients (186 sera and 78 CSF) were tested in actual season, until August 20, 2014.

Results: Of the 534 patients of whom serum was collected, 266 (49.8 %) were West Nile IgM positive. Of the 349 patients with serum and CSF, 191 (54.7 %) were positive for West Nile virus specific IgM antibodies in the both samples. Given that serological test were used, and since that according to the EU case definition, laboratory criteria for case confirmation are WNV specific antibody response (IgM) in CSF, 191 persons meet laboratory criteria for case confirmation.

In actual season, of the 186 patients of whom serum was collected, 27 (14.5 %) were West Nile IgM positive. On the othe hand, of the 78 patients with serum and CSF, 11 (14.1 %) patients were positive for West Nile virus specific IgM antibodies in the both samples.

Conclusion: In conclusion, this study presents number of laboratory confirmed cases in season 2013, but only for neuroinvasive disease (results for CSF). In the cases with non-neuroinvasive WNV infection, for any positive results identified by ELISA, a second more specific confirmatory test should be applied, e.g. NT. Also, the results of molecular epidemiological studies need to help to clarify epidemiological links between cases of the disease and also in tracking movement of viruses which imposes the need to set up an effective system for monitoring the virus.

Keywords: West Nile virus; outbreak; Serbia

POSTER PRESENTATIONS

1. SEROPREVALENCE OF WEST NILE VIRUS AND TICK-BORNE ENCEPHALITIS VIRUS IN SOUTH BACKA DISTRICT AND NISAVA DISTRICT

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Tick-borne encephalitis virus (TBEV) and West Nile virus (WNV) are ARBO viruses, family *Flaviviridae.*

Objectives was to determine the seroprevalence of WNV and TBEV in human sera in Nisava and South Backa District.

Materials and method: a serologic survey was conducted in June 2012. 80 healthy humans from Nisava district and 101 humans from South Backa district were included to the study. All the sera were tested for WNV immunoglobulin G(IgG) and for TBEV immunoglobulin G(IgG) by enzyme-linked immunosorbent assay (ELISA) (Euroimmun, Germani).

Results: In Nisava distict no TBEV IgG positivity was detected. WNV IgG positivity in Nisava district was 2.5%(2/80). In South Backa district IgG antibodies against TBEV were detected in 7.9%(8/101) and IgG antibodies against WNV were detected against WNV 9.9%(10/101).

Conclusion: This study demonstrates the existence of WNV and TBEV in Sauth Backa District. Results for Nisava District suggest circulation of WNV among humans in that part of Serbia, but not of TBEV.

Key Words: Seroprevalence, WNV, TBEV

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2. PREVALENCA HPV TIPOVA 16, 18, 6 I 11 KOD MLADIH ŽENA JUŽNO BAČKOG REGIONA

2. PREVALENCE OF HPV TYPES 16, 18, 6 AND 11 IN YOUNG WOMEN IN SOUTH BACKA REGION

Gordana Kovacevic[1], Ivana Hrnjakovic Cvjetkovic[1,2], Aleksandra Jovanovic Galovic[1], Natasa Nikolic[1], Dusan Vuleta[3], ***Jelena Radovanov*[1],** Aleksandra Patic[1,2], Vesna Milosevic[1,2]

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Objectives

Data on genotype-specific prevalence of HPV types infection in sexually active female population would be useful to predict potential benefits of HPV vaccination as well as post vaccination monitoring. The aim of this study was to determine human papillomavirus (HPV) types 16, 18, 6 and 11 distribution in young women of South Backa region.

Materials and methods

During the 2012 and 2013 specimens from 200 young women (age range, 16 to 26 years) were tested by the commercial HR HPV Real-TM kit (Sacace Biotechnologies, Italy).

Results

HPV DNA was identified in 129 of 200 samples (64.5%). Five most common HPV types circulating among young sexually active women were HPV 16, 31, 51, 18, and 52. Among HPV-positive samples, 50.2% had HPV16 infection; 12.0% had HPV18 infection and 17.7% were infected with LR types 6 and 11.

Conclusion

HPV 16 and 18 together accounted for 62.2% of positive cases and additional 17.7% of infections were caused by low risk HPV types 6 and 11. Results clearly suggest that HPV vaccines would have significant impact on the reduction of cervical carcinoma and genital warts burden in our region.

Key words: HPV, young women, vaccine

3. PRESENCE OF HEPATITIS B VIRAL INFECTION IN THE SOUTHERN BACKA DISTRICT POPULATION

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Objectives:

WHO has estimated that 350 million people worldwide are infected by hepatitis B virus (HBV) every year and over 780 thousand die due to complications, liver cirrhosis and hepatocellular carcinoma. Prevalence of HBsAg varies from 8% in Eastern Europe and Central Asia to 0.5% in Northern Europe. Objective of this study was to estimate the presence of HBV infection in risk groups and in general population of Southern Backa district.

Materials and methods: From January 2013 to July 2014, 18869 serum samples were tested on HBsAg presence, by ELISA (“DS-EIA-HBsAg-0.01”, Italy).

Results: Prevalence of HBV infection was 1.06%. Infections were significantly more present in male gender in total (1.94% vs. 0.57%, $p<0.0001$) and in all age groups, except for 15-25 group and ≧65. HBsAg was found in 0.3% (18/5878) of pregnant women, where prevalence was the highest at the age from 15-25 (0.7%, 8/1088). Among the clients of the center for confidential volunteering testing, the highest prevalence was found in the category of intranasal drug users (6.25%, 1/16) and in the population of homosexuals/bisexuals (1.33%, 2/150).

Conclusion: Results of this investigation show low prevalence of HBV infection in the population of Southern Backa district.

Keywords: HBV, risk groups, ELISA

4. ROTA, NORO I ASTROVIRUSI KAO UZROČNICI GASTROENTERITISA

4. ROTA, NORO AND ASTROVIRUSES AS CAUSES OF GASTROENTERITIS

Patić Aleksandra[1,2], Hrnjaković Cvjetković I[1,2], Ilić S[3], Nikolić N[1], Kovačević G[1], Jovanović Galović A[1], Radovanov J[1], Milošević V[1,2]

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Objectives: Viral gastroenteritis is a major cause of morbidity worldwide. WHO reports put it among the top ten leading causes of death in the world. Rota, noro and astroviruses are the most common causes. **The aim** of this study was to determine the frequency of viral gastroenteritis in Vojvodina.

Materials and Methods: In a two-year period, stool samples of 200 people of all ages from Vojvodina suffering from acute gastroenteritis were examined with Real-time RT-PCR assay (Sacace) for presence of rota, noro and astrovirus nucleic acid.

Results: Of all examined, 50.5% of cases involved children aged 0-5. Among them, 53.46% had one of the 3 tested viruses.

Most patients had rotavirus gastroenteritis (34.65%). Rotavirus infection was significantly more common in children aged 0-2 (40.32%), with most patients aged 2 (43.75%).

Noroviruses were significantly more common in adults older than 20 (38.23%). Most patients were aged 20-29 (50.0%).

Astrovirus infections were detected in 4 individual cases.

Conclusion: Since a viral etiology of gastroenteritis was demonstrated in 51.5% of the cases, we conclude that this problem is present in Vojvodina. Therefore, molecular diagnostics should be introduced into routine laboratory work.

Key words: Gastroenteritis, rotavirus, norovirus, astrovirus, Real-time Polymerase Chain Reaction

5. NAJČEŠĆI UZROČNICI GLJIVIČNIH INFEKCIJA GENITALNOG TRAKTA ŽENA

5. THE MOST COMMON CAUSES OF GENITAL FUNGAL INFECTION IN WOMEN

Suzana Otašević[1,2], M. Ranđelović[2], J. Kostić[1,2], A. Ignjatović[1,2], S. Momčilović[2], D. Zdravković[2]

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Introduction: *Candida*-vulvovaginitis (CVV) is one of the most prevalent genital infection in women. Classification of CVV include: *Candida* colonization, sporadic CVV, and chronic CVV. *Candida albicans (C. albicans*) was dominant cause with prevalence rate higher then 90%. In last years non- *albicans* species, that are known to be resistant to some antimicotics, and non- *Candida* species as *Saccharomyces cerevesiae* frequently cause genital fungal infection.

Objectives: To determine the prevalence of *Candida* species and *Saccharomyces cerevesiae* caused symptomatic vulvovaginitis is the aim of this study.

Material and methods: Research included a mycological examination of vulvo-vaginal swabs of 1439 female patients. *Candida spp*. were isolated using the standard mycological procedures and chromatogenic medium (Chromotogenic Candida, Liofichem/Bacteriology products, Italy). To identify the species of the genus *Candida* and *Saccharomyces cerevesiae* the commercial test of assimilation Auxacolor^{TM} (BioRad, France) and biochemical test Fungitest^{TM} (BioRad, France) were applied. For statistical analyses of collected, systematized and encrypted data, statistical calculator within the program Epi Info (Ver.6.04) and statistical package SPSS (16.0 for Windows) were used.

Results: It was established that fungal genital infection was proved in 15,1% of patients. The dominant cause of CVV is *C. albicans* (75,1%) followed by *C. glabrata* (12,4%) and *C. krusei* (6,0%). Other non-*albicans Candida* species and *Saccharomyces cerevesiae* were isolated from material of significant lower patients percent *(Saccharomyces cerevesiae*- 1,8%; *C. tropicalis* -1,8% , *C. parapsilosis*- 0,9%, *C. kefyr*- 0,9%, *C. guilliermondi* -0,5%). Fungal genital infection is more prevalent in women who are in reproductive period, however statistical significant difference of *C. albicans* and *C. glabrata* infections regarding the age of patients was proved. *C. albicans* is the species (p=0,001) cause of CVV in prereproductive period and *C. glabrata* is the most common (p=0,005) in postreproductive period of women.

Conclusion: Significant percent of women with genital mycosis caused by non-albicans species of genus *Candida* suggest that mycological analysis is necessary regarding the therapy choice, especially in chronic form of infection.

Key words: *Candida*-vulvovaginitis, *Saccharomyces cerevesiae*, prevalence

6. RESULTS 2011-13. FROM SMART IN SOUTH AND SOUTHEAST SERBIA

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Introduction: SMART was initiated in 2002 and is an on-going worldwide surveillance study monitoring the in vitro susceptibility of intra-abdominal and urinary tract aerobic and facultatively anaerobic gram-negative bacilli. In September 2012 study had 217 active investigational centers. SMART was initiated in Serbia in 2011, with 2 sites - Clinical Center of Serbia and Clinical Center Nis. SMART is sponsored by Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Whitehouse Station, NJ, USA. **Study Objectives:** To monitor the in vitro susceptibility of clinical bacterial isolates to antimicrobials in intra-abdominal and urinary tract infections worldwide. Also,to identify early changes in susceptibility patterns of community- or hospital-acquired organisms, including those that produce extended-spectrum β-lactamases (ESBLs) and other resistance mechanisms including carbapenem resistance. **Study Methods:** Isolates are identified to the species level and tested at each of the study sites using local laboratory methods. Every year study collect up to 100 consecutive aerobic and facultative gram-negative bacilli from patients with intra-abdominal and 50 urinary tract² infections, including only unique initial isolates, with recording duration of hospitalization (<48 h or ≥48 h) at time of isolate recovery. A centralized database of SMART study findings is maintained by International Health Management Associates. Antimicrobials included in investigation were: Ampicillin/sulbactam, Piperacillin/tazobactam, Amikacin, Ertapenem, Imipenem/cilastatin, Levofloxacin, Ciprofloxacin, Cefoxitin, Cefotaxime, Ceftazidime, Ceftriaxone and Cefepime. **Results:** The most frequently isolated microorganisms in the period 2011-2013 at the Clinical Center Niš were: *Escherichia coli* (44%), *Klebsiella pneumoniae* (15%), *Proteus mirabilis*(11%) and *Pseudomonas aeruginosa (*9%). The most common ESBL + isolates were *Klebsiella pneumoniae* (74%), *Proteus mirabilis* (49 %) and *Escherichia coli* (19%), respectively. Increase in number of ESBL + isolates in the examined period was noted in *Escherichia coli* and *Klebsiella pneumoniae*. Susceptibility to all of the test antimicrobials in *Escherichia coli* amounts to more than 80%, except for the ampicillin-sulbactam (52%), while in the carbapenem was 100%. In the three-year investigation period recorded a decrease susceptibility to all tested drugs except carbapenems. Susceptibility of *Klebsiella spp.* is the lowest of all tested pathogens (around 30% for all tested drugs except carbapenems). Sensitivity to imipenem was 90% and 61% to ertapenem. Susceptibility of intra-abdominal isolates is about 55% for all the tested drugs except levofloxacin and amikacin (80%), imipenem (100%) and ertapenem (80%), while in the urinary isolates susceptibility were approximately 20% for all the tested drugs except amikacin (50%), imipenem (86%) and ertapenem (53%). Reduction of sensitivity to all tested drugs is about 20% of the isolates from urine. The sensitivity of intra-abdominal isolates of *Proteus mirabilis* was about 35% for all tested drugs except piperacillin tazobactam (89%) and ertapenem (100%). Susceptibility to imipenem is 50%. Sensitivity in isolates from urine was approximately 20% of all tested drugs except piperacillin tazobactam (86%), and ertapenem (100%). Susceptibility to imipenem is 29%. The increase in resistance

to all tested drugs except piperacillin- tazobactam and ertapenem is about 40%. In *Pseudomonas aeruginosa* greatest sensitivity is noted to ceftazidime and piperacillin-tazobactam (78%). There was an increase in the sensitivity to ceftazidime and amikacin. Overall, the sensitivity of intra-abdominal isolates was better than the sensitivity of the isolates obtained from urine, for all tested pathogens. **Conclusion:** Stady gives insight into the local and regional distribution of gram-negative pathogens and track prominent pathogens over time. Also, allows for local/worldwide analysis of susceptibility and identifies differences in community vs. hospital-acquired infections. That data may help identify the best options when facing resistance.

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7. *LISTERIA MONOCYTOGENES*- IZOLATI DOBIJENI IZ KRVI I CEREBROSPINALNE TEČNOSTI BOLESNIKA HOSPITALIZOVANIH U KLINIČKOM CENTRU U NIŠU.

7. *LISTERIA MONOCYTOGENES* ISOLATED FROM THE BLOOD AND CEREBROSPINAL FLUID OF PATIENTS HOSPITALIZED IN THE CLINICAL CENTER NIŠ

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Listeria monocytogenes (*L. monocytogenes*) is the cause of infection in animals, and humans are infected after consuming contaminated food. The microorganism can be found in the soil and plants, but also in the stool of healthy humans. Listeriosis is a rare disease in humans, but when present, it may produce severe systemic events such as bacteriemia and meningitis. Pregnant women, newborns and immunodeficient persons are most commonly affected.

The aim was to present the isolates of *L. monocytogenes* isolated from the material obtained from hospitalized patients, as well as their sensitivity to antibiotics.

Material and methods: In the period from January 2012 to September 2014, in the laboratory for pioculture, Public Health Institute in Niš, we performed bacteriologic examination of 2880 blood samples and 580 samples of cerebrospinal fluid (CSF) obtained from the patients of the Clinical Center Niš. *L. monocytogenes* was isolated utilizing standard methodology and identified by using the VITEK 2 system (bioMerieux, France)/ BBL Crystal GP (Becton Dickinson, USA). The susceptibility testing was performed using Etest strips (bioMerieux, France) and the test was read according to the EUCAST interpretive standards.

Results: Out of the total number of examined blood samples and CSF, positive findings were obtained in 435 and 62 samples, respectively. *L. monocytogenes* was isolated from the material of five patients, out of which three adults, one child aged 4 months and one child aged 5 years. Ten isolates were obtained, out of which three from the blood and seven from the CSF. In three patients, *L. monocytogenes* was isolated only from the CSF, and in two both from the blood and CSF. All the isolates were sensitive to penicillin G, ampicillin, erythromycin, meropenem, and trimetoprim/sulfamethoxazole.

Conclusion: Although *L. monocytogenes* belongs to rare causes of meningitis, a timely etiological diagnosis is required, especially in the cases in which empirical therapy does not contain the agents of choice for the treatment of infections caused by this microorganism. The susceptibility test demonstrates that the drug of choice is ampicillin, i.e. trimetoprim/sulfamethoxazole in those allergic to penicillin.

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8. NONTUBERCULOUS MYCOBACTERIA ISOLATED FROM RESPIRATORY SPECIMENS IN BELGRADE: A 4-YEAR RETROSPECTIVE STUDY

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Introduction: An increase in the isolation of nontuberculous mycobacteria (NTM) from clinical specimens has been noted worldwide.

Objective: The aim of the study was to determine the frequency of isolation of NTM from respiratory specimens in Belgrade over a 4-year period, and to analyse the demographic parameters in patients whose specimens yielded NTM isolates.

Material and methods: Retrospective analysis of laboratory records for the period June, 2010 - June, 2014 was performed at the Laboratory for mycobacteria, Municipal Institute for Lung Disease and Tuberculosis, Belgrade.

Results: Out of 2314 cultures of mycobacteria recovered from respiratory specimens over the study period, 359 (15.5%) were identified as NTM. Molecular identification by the GenoType CM assay (Hain Lifescience) was performed in 163 isolates. In total, nine species of NTM were recognized, while 36 isolates were identified as *Mycobacterium* sp. The most frequently isolated NTM species was *M. xenopi* (76/163; 46.6%). The 163 isolates originated from 97 patients. Fifty (51.5%) patients were older than 65 years, while gender distribution was 40 (41.2%) men and 57 (58.8%) women.

Conclusion: According to the available data, the isolation rate of NTM in Belgrade is comparable to increased isolation rates of NTM noted in other surveys. The isolation of NTM was significantly associated with older age and female gender.

Key words: nontuberculous mycobacteria, molecular identification

9. REZISTENCIJA IZOLATA *CAMPYLOBACTER JEJUNI* I *CAMPYLOBACTER COLI* NA TESTIRANE ANTIBIOTIKE

9. RESISTENCE OF *CAMPYLOBACTER JEJUNI AND CAMPYLOBACTER COLI* ISOLATES TO THE ANTIBIOTICS

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Introduction: Thermophilic *Campylobacter* spp. are leading cause of bacterial enterocolitis. Disease is usually milde and self-limiting. In some cases antimicrobial treatment is necessary with erythromyicin as drug of choice. Fluoroquinolonese were also efficient until recently.

Aims: To determine the prevalence of resistant strains of thermophilic *Campylobacter* on our geographical locality.

Materials and methods: Resistance to antibiotics was monitored in 255 strains of *C. jejuni* and *C. coli* isolated and identified over a period 2012-2014. in the NRL for *Campylobacter* and *Helicobacter* Public Health Institute in Niš. Sensitivity of the strains to antibiotics was examined by disk-diffusion method on blood agar enriched with 5% of sheep blood according to CLSI 2013 and CLSI 2006 criteria.

Results: Out of 255 strains, 225 *C. jejuni* strains and 30 strains of *C. coli* were examined. All of the tested strains were resistant to cephalothin and sensitive to imipenem, except one isolate of *C. coli*, others were sensitive to chloramphenicol (99.60%). Of the total number of strains tested, resistance to erythromycin was registered in 5 isolates (1-*C.jejuni*; 4-*C.coli*)(1.96%). The resistance to ciprofloxacin was determined in 192 isolates (76.8%), while resistance to nalidixic acid was 189 (74.11%).

Conclusion: Since most of the strains were sensitive to erythromycin, gentamicin, tetracycline, chloramphenicol and imipenem, these antibiotics can be used in the therapy of diarrhea and severe extraintestinal cases of disease caused by thermophilic campylobacter. However, resistance to quinolones diminishes their application and urges necessities of antibiotic susceptibility testing.

Key words: *Campylobacter jejuni*, *Campylobacter coli*, antibiotic resistance, antimicrobial drugs

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10. BIOTIPIZACIJA SOJEVA *CAMPYLOBACTER JEJUNI* I *CAMPYLOBACTER COLI* IZOLOVANIH U SRBIJI

10. BIOTYPING OF *CAMPYLOBACTER JEJUNI* AND *CAMPYLOBACTER COLI* STRAINS ISOLATED IN SERBIA

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Introduction*:Campylobacter jejuni* (*C. jejuni*) and *Campylobacter coli* (*C. coli*), one of the major causes of bacterial enterocolitis worldwide could be differentiated (typed) by several methods: biotypng, serotyping, and molecular methods for epidemiological and outbreak investigations. Biotyping scheme based on biochemical activity can subtype *C. jejuni* in three subtypes and *C. coli* in two subtypes.

Aim: The aim of this work was to detect prevalence of some biotypes in investigated strains and other differential characteristics of strains in Serbia.

Materail and methods: We investigated 61 strains of thermophilic campylobacters isolated in patients with enterocolitis from collection of National Reference Laboratories (NRL) for *Campylobacter* and *Helicobacter in* Serbia. Strains were previously isolated in selective campylobacter media in microaerophilic conditions at 42^{o}C and presumably identified by colony morphology, Gram staining, oxidase, catalase tests and hippurrate hydrolysis. Final identification and characterization of investigated strains was done by a combination of a PCR-based RFLP test and biotyping tests: hippurate hydrolysis, rapid H_2S, production and DNA hydrolysis tests.

Results: The ratio of *C. coli* to *C. jejuni* strains was 18:43. This showed that *C. coli* were less common than *C. jejuni* in Serbia. Biotyping was performed on all 61 strains. Three biotypes were identified in *C. jejuni* strains; biotype I (17 isolates), biotype II (19 isolates) and biotype III (7 isolates). In *C. coli* strains, biotype I was represented by 13 strains, and biotype II by 5 strain.

Conclusion: In *C. jejuni* biotype II were predominant, while in *C. coli* strains, it was *C. coli* biotype I.

Key words: *Campylobacter jejuni*, *Campylobacter coli*, biotyping

Acknowledgements

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11. ZNAČAJ BAKTERIJE *BACILLUS CEREUS* U ETIOLOGIJI ENTEROKOLITISA

11. THE IMPORTANCE OF *BACILLUS CEREUS* IN THE ETHIOLOGY OF ENTEROCOLITIS

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Introduction: *Bacillus cereus*is (*B. cereus*) are Gram- positive, motile, endospore forming, aerobic or facultatively anaerobic bacteria. *B. cereus* is widely distributed in nature. This bacterium belongs to the genus *Bacillus*. It can cause diseases that can be manifested as diarrheic syndrome or emetic syndrome.

Materials and methods: Examinations were performed in the Microbiology Center of Public Health Institute of Niš from November the 15th, 2011 to july, the 1st 2014. Stools were examined in patients who were suffering from enterocolitis. The stools were examined by the standard microbiological methods for the presence of the following bacteria: *Salmonella, Shigella, Yersinia, Campylobacter, Aeromonas, Clostridium difficile* and *B. cereus*. The examination of the production of the non-hemolytic enterotoxin (NHE) and the hemolysin BL (HBL) toxin was conducted by the immunochromatographic test (Merck, USA). Susceptibility testing to antibiotics was carried out using disk diffusion method and beta lactamase production by cefinase disk (bioMérieux, France).

Results: 24734 samples of stool were examined (20676 ambulatory and 4058 clinical). Pathogenic bacteria were detected in 1426 samples (5.77%). The total number of positive isolates demonstrated the presence of *Salmonella* in 21.85%, *Shigella* were not detected, *Yersinia* in 5.52%, *Campylobacter* in 8.99%, *Aeromonas* in 0.33%, *Clostridium difficile* in 53.67% and *Bacillus cereus* in 9.65%. Female persons were more sensitive to *B. cereus* infection (64.96%) and patients between 56 and 65 (19.66%) years of age. The presence of NHE and HBL toxins was examined in 49 samples. The presence of both toxins was detected in 48 ones, and just one toxin (NHE) in one examinee. Investigated strains were susceptible to ampicillin, co-amoxiclav and ciprofloxacin, but resistant to tetracycline and rifampicin. It was found that the strains produce cefinase.

Conclusion: *B. cereus* cause enterocolitis more often in female persons and are more common in patients between 56 and 65 years of age.

Key words: *Bacillus cereus,* enterocolitis

Acknowledgements

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12. QUALITY CONTROL OF MICROBIOLOGICAL TESTS OF FOOD AND WATER BA INTER LABORATORY (PROFICIENCY TESTING SCHEMES)

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Public Health Centre – Bitola R.Macedonia

Introduction: The laboratory for sanitary microbiology is included in the rank of accredited laboratories according to ISO/IEC 17025 Standard.

Besides the application of the ISO Methods in the everyday routine testing, in accordance to the requirements of ISO 17025 Standard, each laboratory must provide internal and external control of the testing quality.

Aim: One of the essential elements for conducting of external control of the quality of the results from the microbiological testing of food and water is the participation in Proficiency testing schemes (PT) that are organized by reference laboratories FEPAS (Food Examination Performance Assessment scheme) and LEAP (Laboratory Environmental Analysis Proficiency scheme).

Material and methods: Identification and enumeration of the defined parameters is done in the dehydrated samples of food (beef and chicken, flour, powder milk, soft cheese) and water samples.

Results:

When analyzing the data, the results received with participation in the inter laboratory comparison testing's, statistical methods are applied, including evaluation of the results according to the Z-value (a simplified method of Mandel h statistics). Z-value is calculated according to the following formula: $Z = (x-X)/\delta$, where: x – result of individual laboratories, X – determined, received value in a reference laboratory δ – standard deviation

Regardless of the number of laboratories, participants and the number of repeated tests, Z-values have the following interpretation: $z <= 2$ – satisfactory results, $2 <= z <= 3$ - doubtful, questionable results, $3 <= z$ – unsatisfactory results.

The goal of each lab is to get acceptable results of the tests, i.e. $z <= 2$, indicating the reliability of the results.In our laboratory are obtained results that are in the permitted range $z <= 2$:

coagulase positive staphylococci z –score 0,8; yeasts and molds -0,5; Enterobacteriaceae -0,3;E.coli -0,5.(tests of food); Except in quantitative,we have participated in qualitative PT - scheme for detection Salmonella spp. and Listeria monocytogenes, where the results are based on the presence and absence of the requested bakteria.And these tests are assessed as satisfactory results..In the samples of water were obtained the following results: for Escherichia coli z-score 0.5, Enterococcus-0,3i Pseudomonas aeruginosa -0,3.

Conclusion:

Based on the results from the interlaboratory tests (FEPAS and LEAP) derives that with the applied methods for testing water and food in our laboratory are obtained reliable results . This enables continuous improvement and development of new methods, and also checking the quality of work internationally.

Keywords: Proficiency testing shemes, LEAP,FEPAS

13. IS THE MPN METHOD BASED ON THE DEFINED SUBSTRATE TECHNOLOGY AN ADEQUATE SOLUTION TO THE QUANTIFICATION OF ENTEROCOCCI IN SURFACE WATERS?

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Public Health Institute Čačak

Introduction: Enterococci are valuable indicators for evaluating the level of fecal contamination of surface waters. The recently adopted Rulebook on Parameters Indicative of the Ecological and Chemical Status of Surface Waters requires laboratories to quantify enterococci over a wide range of 40 to > 40000 when assigning surface water bodies to ecological status classes. MPN-based methods previously used cannot meet this requirement. Therefore, laboratories performing surface water testing must opt for other diagnostic procedures to satisfy the new requirements.

Objective: To evaluate the potential use of the method based on the defined substrate technology (IDEXX Enterolert E/Quanti-Tray 2000) for determining enterococcal counts through comparison with the national standard MPN method published in NIP PP 1990, Drinking Water, Standard Hygiene Testing Methods.

Material: During 27 June 2012 – 11 December 2012, a total of 20 samples of surface waters collected from the Moravica Region were analyzed. The samples were collected in accordance with the Guidance on Surface Water Sampling.

Method: After homogenization, adequate dilutions of the samples were performed following the national method and the Enterolert manufacturer's instructions. Then, the samples were analyzed using both methods. The enterococcal count obtained was used to assign the surface waters to ecological status classes, thus providing basis for comparison of the two methods.

Results: The data analysis shows that in 18 out of 20 samples the enterocccal counts obtained by both methods suggest identical classification of the surface waters analyzed (classes matching). Classes did not match only in two samples (samples 1 and 10).

Conclusion: - IDEXX Enterolert E/ Quanti Tray / 2000 results are definitive at 28 h.

-Both sample preparation and testing are simple procedures that require minimum staff involvement.

- The results of both methods based on the comparison of the estimated ecological status of surface waters are equivalent for a high percent of samples.

The above findings suggest that MPN methods based on the defined substrate technology are a highly suitable solution to the enterococci quantification problem facing laboratories performing surface water testing.

Keywords: Enterococci, surface waters, defined substrate technology

14. THE EFFECTS OF THE FLOW OF UNTREATED COMMUNAL WASTE WATER ON THE MICROBIOLOGICAL QUALITY OF THE RIVERS OF MORAVICA DISTRICT

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Introduction: Microbiological quality of rivers is marked by testing of the concentration (number/100ml) of bacteria which indicate fecal contamination. The presence of these microorganisms mostly suggests the possibility of pathogenic microorganisms present in the water and therefore high risk of using such water for drinking, irrigation and recreation.

Aim: To carry out microbiological testing of river water samples on the territory of Morava district both before and after the flow of untreated communal waste water.

Material and method: In the period from 27/06/2012 – 11/12/2012, testing of 20 river water samples on the territory of Moravica district was carried out. The samples were tested in the laboratory using IDEXX Colilert and Enterolert tests. The calculation of MPN was done using tables, taking into account the sample dilution.

Result: The number of total coliform bacteria before the flow of untreated communal waste water varied from 12450 to 460400, the number of *E.coli* from 80 to 244200, and the number of enterococci from 80 to 79452.

The number of total coliform bacteria after the flow of untreated communal waste water varied from 14750 to >1209800, the number of *E.coli* from 6750 to >1209800, and the number of enterococci from 430 to > 96784.

Conclusion: Ecological status of rivers on the territory of Moravica district can be classified as bad or poor, even before the flow of untreated communal waste water. The flow of untreated communal waste water has multiple effects on deterioration in the values of microbiological parameters which are used in marking the ecological status.

Key words: total coliform bacteria, rivers, waste water, microbiological quality

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Tijana Krnjeta

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Dr John Ellis

Neomedica Niš
Hitachi Chemical Diagnostics, Inc.
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SESSION: ACTUAL PUBLIC HEALTH PROBLEMS OF COMMUNICABLE DISEASES

INVITED LECTURES

1. QUARANTINE DISEASES TODAY

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University of Niš, Faculty of Medicine

Public Health Institute Niš

The world population is highly mobile.International travel and troop movements increase the risk of communicable disease transmission.Forced migration for war and famine, and voluntary immigration increase communicable disease risk.

It is very important to distinguish between the isolation of quarantine.

Definition: Isolation

Separation and restricted movement of *ill* persons with contagious disease

- Often in a hospital setting
- Primarily individual level, may be applied to populations
- Often voluntary, but may be mandatory
- Fundamental, commonly used public health practice

Definoitin: Quarantine

Separation and restriction of movement of *well* persons presumed to have been exposed to contagion

- often at home or residential facility
- may be voluntary or mandatory

In most countries in the world and in Serbia Quarantinable Diseases: Smallpox ,Plague ,Viral hemorrhagic fevers,Yellow fever, SARS.

However, a number of states, and the United States added to this list and : Cholera , Infectious tuberculosis, Diphtheria, Novel influenza virus (pandemic potential).

Certainly the most important groups of quarantine diseases are Viral hemorrhagic fever.

Viral hemorrhagic fever (VHF) refers to a diverse group of viral pathogens that are characterized clinically by fever and a bleeding diathesis. Manifestations may include flushing of the face and chest, petechiae, mucosal and gastrointestinal bleeding, frank bleeding, malaise, edema, hypotension, myalgias, headache, vomiting, and diarrhea. In extreme cases, shock and death may occur because of circulatory instability due to increased vascular permeability and diffuse hemorrhage.

Several viral infections are responsible for causing VHF. These viruses are often transmitted by arthropods, especially mosquitoes. Sometimes the infection may be spread from person to person through direct contact with infected patients, their blood, or their secretions and excretions. Animal reservoirs are generally rodents, but domestic livestock, monkeys, and other primates may also serve as intermediate hosts.

The distinct enveloped RNA viruses that cause most VHF cases are members of 4 families: Arenaviridae, Bunyaviridae, Filoviridae, and Flaviviridae.

Lassa fever is caused by a single-stranded zoonotic RNA virus of the Arenaviridae family. First described in 1969, infection occurs in West Africa and is named after the town in Nigeria where the first cases were observed. The "multimammate rat" of the genus *Mastomys* is a common village rodent and is a host for the virus. The virus is spread to humans by direct contact with infectious rodent urine and droppings. Transmission can occur through cuts and sores, as well as by inhalation of infectious particles. Person-to-person transmission can occur through contact with infectious blood, tissue, secretions, and excretions, but not through casual contact such as skin to skin

Crimean-Congo hemorrhagic fever (CCHF) is caused by the *Nairovirus* in the family *Bunyaviridae*. It was first characterized in the Crimea in 1944 and recognized in 1969 in the Congo. CCHF is found in Eastern Europe (particularly in the former Soviet Union), throughout the Mediterranean, in Northwestern China, Central Asia, Southern Europe, Africa, the Middle East, and India. The principal host vector is the *Hyalomma* tick. Cattle, goats, sheep, and hares serve as amplifying hosts for the virus. Transmission to humans occurs through contact with infected animal blood or infected ticks. Person-to-person transmission may occur, resulting in nosocomial outbreaks.

Yellow fever is an anthroponotic infection (vector-borne person to person) caused by the yellow fever virus, a flavivirus. Infection occurs in tropical regions of Africa and in parts of Central and South America and is vectored by *Aedes* mosquitoes. Human infection occurs via mosquito bites after the mosquito has fed on infected monkeys. Urban yellow fever, however, is the most common cause of yellow fever outbreaks and epidemics. In such cases, mosquitoes live among humans in cities, towns, and villages and spread the virus among susceptible humans. The presence of infectious mosquitoes is facilitated by larval growth in discarded tires, flower pots, oil drums, and water-storage containers.Mortality ranges from 15% to more than 50%. Vaccination against yellow fever is recommended before travel to the Amazon forest. For those who acquire clinical illness, there is a 3- to 6-day incubation period.

Dengue fever (DF) is viral illness transmitted by mosquitoes. It is found in tropic and subtropic regions, including the Indonesian archipelago, northeastern Australia, South and Central America, Southeast Asia, and Sub-Saharan Africa. DF is caused by a flavivirus and has 4 described serotypes. Infection is transmitted to humans by mosquitoes. Most infections are self-limited and influenzal in nature. Other manifestations include dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).

Ebola virus hemorrhagic fever (HF) is named after a river in the Democratic Republic of the Congo (formerly Zaire) in Africa where it was first recognized in 1976 and has appeared sporadically since its initial recognition. The incubation period for Ebola HF ranges from 2 to 21 days. Within a week, a raised rash, often hemorrhagic (bleeding), spreads over the body. Typically there is bleeding from the mucous membranes (eg, mouth, nose, eyes, and rectum). This image shows treatment of patients with Ebola HF during outbreak of the disease in 1995 in Kikwit, Democratic Republic of the Congo, as well as an Ebola HF prevention poster used during the Kikwit outbreak.

Closely related to Ebola is Marburg HF virus. Marburg HF has been reported in Uganda, Zimbabwe, the Democratic Republic of the Congo, Kenya, and Angola. Cases of Marburg HF outside Africa are rare but have been reported in Europe.

The 2014 West African Ebola Outbreak is so far the largest and deadliest recorded in history. The affected countries, Sierra Leone, Guinea, Liberia, and Nigeria, have been struggling to contain and to mitigate the outbreak. The ongoing rise in confirmed and suspected cases, 2615 as of 20 August 2014, is considered to increase the risk of international dissemination, especially because the epidemic is now affecting cities with major commercial airports.

Due to the increasing threat of bioterrorism, these highly infectious and potentially lethal viruses are of increasing concern.

Good surveillance does not necessarily ensure the making of right decisions, but it reduces the chances of wrong ones.(Alexander D. Langmuir,The State University of New Jersey)

2. EPIDEMIOLOGICAL - DIAGNOSTIC ASPECTS OF INFECTIONS CAUSED BY CLOSTRIDIUM DIFFICILE

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C. difficile is a typical representative of the genus Clostridium, which comprises a group of Gram-positive, moving, or aerotolerantnih anaerobic bacilli, ubiquitous in soil and in the intestinal tract of animals. Spore forming subterminalno rarely central. Spores are resistant to heat, drying and chemical agents that enables them to survive in adverse environmental conditions. After 48 h incubation the medium CCFA C. difficile colony-forming a yellow color, which are raised, with the circular thin filamentous edges, uneven surface size 2-4 mm (1).

Diseases that are known to cause a disease associated with the presence of C. difficile (C. difficile-associated disease - CDAD). CDAD is normally occurs a few days after the receiving an antibiotic (1). Giving antibiotics causes a change in the normal relations of bacteria that inhabit the digestive tract allowing C. difficile to proliferate and colonize the lining of the intestinal tract. After colonization of toxigenic C. difficile strains capable of producing two exotoxins, enterotoxin (toxin A) and cytotoxin (toxin B), which can cause diarrhea and colitis. CDAD is clinically manifested by diarrhea, colitis, pseudomembranous colitis (PMC), fulminant colitis and toxic megacolon. CDAD may complicate ulcerative colitis or Crohn's disease.

When 8-50% of patients with CDAD, after application of the therapy, which destroys the C. difficile can occur back (recurrent) form of CDAD. It is assumed that the basis of recurrent infections is sporulation of C. difficile during therapy, which after treatment discontinuation are subject to germination. When 15-20% of the patients is the recurrent form of the disease caused by the same strain that caused the primary infection (relapse). However, the use of serotyping, ribotyping PCR or restriction endonuclease analysis of chromosome number of researchers suggest that most of the recurrent CDAD caused by other types of strain (re-infection) (2).

The diagnosis of CDAD

The microbiological diagnosis of CDAD primary cultivation takes place in appropriate nutrient media. Grown colonies with characteristic morphology, are identified based on antigenic structure and biochemical activity. Due to the rapid degradation of toxins and loss of cytotoxic activity is necessary to examine fresh stool samples. If this is impossible, then they should be stored at 4 ° C up to 48 h, frozen at -20 ° C or at best -70C (3).

Clinical methods: The clinical manifestations of CDAD include diffuse abdominal pain, stool odor softer or liquid coexistence and fever. These symptoms are not specific and not essential for diagnosis. Leukocytosis dominated during CDAD but is also uncertain diagnostic sign.

Endoscopy: pseudomembrane are the size of raisins, yellow and sometimes formed and raised plaques surrounded by inflamed mucosa. The appearance of pseudomembrane may be

sufficient in most cases for macroscopic diagnosis but recommended biopsy for histopathological diagnosis, especially in volcanic lesions (4).

Fecal leukocytes and lactoferrin: results of various studies suggest that detection of fecal leukocytes in the preparation colored methyl-blue may be useful in distinguishing cases of noninflammatory diarrhea. More valid marker for the presence of leukocytes in a sample of faeces is fecal lactoferrin, which can be detected by latex agglutination (5).

Detection of the products of C. difficile:

Glutamate dehydrogenase: represents specific marker of C. difficile. By nature of the enzyme and is introduced as a commercial test in order to verify the genuineness of positivity latex immunoassay detecting toxin A. Today this test usually commercially produced along with test detecting the toxin A (6).

Highly volatile fatty acids: C. difficile produced readily volatile fatty acids, and it isocaproic, isovaleric and para-cresol. Tests can also work directly from feces or culture. Toxins: can detect biological (cell cytotoxicity test) and immunological methods (latex agglutination or immunoassay).

The test of cell citotoksik: observed that stool of patients with colitis caused by antibiotics damage cell culture and before the C. difficile is recognized as the cause of CDAD. For this reason, the test cell cytotoxicity recommended as ,, gold standard,, in the diagnosis of CDAD. The test is performed on a single layer of cells exposed to the impact of the filtrate chairs. After incubation, a microscope is required cytopathic effect (7).

Latex agglutination toxin A: Compared to the cytotoxic assay, latex tests show a good negative predictive value but also a high rate of false pozitivninih reaction (8).

Immunoassay: during the last thirty years have developed two types of immunoassays, classic with various embodiments, the membrane imunohromatografija which has not found wide application.

Detection of gene sequences C. difficile:

16sr RNA: primary objective detection 16srRNA genes to determine the presence of a microorganism in a stool sample (9). This process reveals toxigenic but netoksigene strains of C. difficile.

The genes encoding the toxins: Using PCR method and the reproduction of part of the gene encoding the toxin A of the chair is described in 1993. Wherein the results are fully compliant with the test cell cytotoxicity. Detection of toxin B from stool PCR method is described in the same year (10**).**

Typing: typing of isolates is of great importance in microbiological research and descriptive epidemiology.

Knowledge acquired during their studies typification of C. difficile

By using different methods typification of C. difficile during the last 15 years, we obtained data that contributed to the understanding of the epidemiology of this bacterial species. Probably the most comprehensive data come from a reference laboratory for anaerobes the

Cardiff, where he keeps more than 2000 isolates obtained from stool of patients 58 British hospitals. Total has identified 54 different types of PCR ribonukleinskih when it comes isolates recumbent patients, but only 16 PCR ribonukleinskih types account for 90% of all samples and PCR RNA Type 1 is represented by 58%. The next most common strain, PCR RNA type 106, accounts for 7% of the isolates, and has expanded over the past few years in London and the South East of England in relation to its source - the central part of the United Kingdom. The research results indicate that the PCR type 1 endemic in almost all hospitals that follows the reference laboratory, and to be associated with acute and prolonged outbreaks of CDAD. PCR type 1 was responsible for the most famous outbreak of CDAD in the UK when it was infected 175 people, of which 17 died (11). Brazier's study (12) determined that the PCR type 1 corresponds Delme's serogroup G, and also this strain has caused infections in the United States. PCR type 1 is determined that corresponds to the strain of D1 described by Samore MH. with et al. (13). Samore has learned that this is the most commonly isolated strain from samples of natural environments, from hospital workers and patients from the hospital on the east coast of America.

Delme's group of researchers reported that serogroup C usually causes outbreaks in Belgium (14). This serogroups corresponding PCR Tipu 12, which represents only 2.6% of all hospital isolates typed in England and Wales. A study conducted in 11 hospitals of France (15), suggesting that serogroup C, D, G and H are the most frequently isolated strains, with the prevalence of serogroup H (21%). Serogroup C is most commonly associated with diarrhea izazvnom antibiotics. The results of most studies show that a large number of cases of CDAD caused by the same strain of C. difficile. However, there are studies that are group CDAD cases caused by different strains. These sporadic cases suggest that it is not always about cross-infection and are most likely caused by strains introduced from outside the hospital environment (community).

C. difficile serogroup F produces only toxin B, and the corresponding PCR Tipu 17 Information typization strains of C. difficile in England and Wales show that in 10 British hospitals (16) detected toxin A negative / toxin B positive strains. They account for less than 3% in relation to all standardized isolates. It is possible that these strains do not detect it in the diagnosis CDAD commonly used tests that detect only toxin A.

Research conducted in England showed different representation PCR ribonukleinskih types of C. difficile, which are isolated from hospitalized patients compared to those cultured from patient samples were examined and treated in outpatient general practitioner. The study tests the isolates obtained from samples of people living in the community, usually was cultivated nontoxic PCR type 10 (15.9%). PCR RNA types 20:14 were present in 11.8% and 8.7%. PCR type 1 was represented by only 7.4%. The published results indicate that certain strains probably more rapidly in the very hospitals and hospital departments conditions themselves act as a selector for the presence of certain strains.

The epidemiology of CDAD

Previous studies do not provide direct evidence that C. difficile infection may be the origin of the animals (zoonoses), but there is evidence of large numbers of domestic, wild, farmer animal species that are reservoirs and carriers of this bacterial species (17).

This bacterial species can be found in 80% of newborns, with no clinically significant events, which represents the transitory colonization or normal flora. The high rate of carriers persisted during the first 8 months of life until the establishment of the normal intestinal flora, and then

decreases and falls to 2-3% in adults. The rate of carrying among adults residing in hospitals is much higher (up to 21%) (18).

The reservoir, source and transmission of C. Difficile

Significant reservoir of C. difficile in hospitals, patients with asymptomatic carriers of the symptoms and patients with CDAD that contaminate the hospital environment spores and vegetative forms. Spores of C. difficile can be held for several months in hospital surfaces (floors, furniture, medical equipment, etc..), Which contributes to a slight spreading infection. Transmission of infection is feco-oral. Spores and vegetative forms but C. difficile is usually transmitted from contaminated surfaces and objects in patients over the dirty hands of medical personnel. Some studies indicate that it is possible and direct entry of C. difficile in the gastrointestinal tract of contaminated objects. Remove the patient from room to room or to another ward or hospital is also important in the transmission of the disease (19).

Incidence and prevalence of CDAD

The incidence of CDAD is different and ranges from 0.1 - 2%. This incidence are covered outpatient as well as patients with hospital infections, C. difficile (over 90% of cases are considered hospital infections). The results of individual studies indicate that the annual incidence of outpatient cases of CDAD 8 per 100,000 residents. Reports from the area of the United Kingdom suggest that the incidence of CDAD in patients on an outpatient basis increases of 1 case per 100,000 inhabitants during 1994 yr. to 22 during 2004.. It is interesting that only 37% of outpatients during the 90 days prior to the diagnosis of CDAD used antibiotics. Results of the study Hirschorn L. et al. (USA) (20) showed incidence of 7.7 cases per 100,000 population per year.

Risk factors for the occurrence of CDAD

According to data from the published studies 70 - 90% of diseases caused by C. difficile occur after the administration of antibiotics. The use of antibiotics in many cases has resulted in killing bacteria of the normal flora of the digestive tract. Antibiotics are prior to the CDAD usually administered in a combination of two or more. The combination of antibiotics or long-lasting application increases the risk of disease (21).

A large number of research points to the significant risk factors for nosocomial CDAD. A statistically significant difference in the study Raveh D. et al. (22) was observed in patients age ($p < 0.0001$) (76 vs 66 years) stay in intensive care unit ($p < 0.05$) in the number of leukocytes ($p < 0.001$) , a higher level of urea nitrogen in blood ($p < 0.05$), serum albumin less ($p < 0.01$) and primnju diuretics and clindamycin ($p < 0.05$). In studies Gareja K. et al. (23) indicates that patients with CDAD age from 50 to 80 years old ($p = 0.016$), and that the most significant risk factors significantly associated with the development of CDAD: age greater than 80 years ($p = 0.001$), presence of hemodialysis ($p = 0.0227$), a longer stay in hospital rooms and intensive care ($p = 0.001$). In addition to Al-eidan FA. et al. (24) there are also studies that indicate that women often reported diarrhea during hospitalization (54%: 46%), which explains the use of antibiotics in the treatment of urinary tract infections, but unlike them, there are a number of studies indicating that there are no statistically significant differences by sex patients with CDAD.

The presence of severe underlying disease, according to results of a large number of research results in significant predisposing factor for the development of CDAD in hospitalized patients. In a study of Al-eidan FA. et al. All 87 patients hospitalized with CDAD had severe

underlying disease: pneumonia or other respiratory infections - 46%, 42% diabetes, ischemic heart disease - 34.5%, hypertension - 31%, chronic obstructive diseases of the respiratory tract 17%, kidney 3.3% liver disease and 2.3%. In 21 patients (24.1%) indicated the presence of two or more diseases at the same time.

Due to the high risk and likelihood of occurrence of CDAD in the elderly is not surprising the large number of studies that perceive risk factors for the occurrence of CDAD in people older than 60 years. Ackermann G. et al. (25) in their work pointed out that with the use of antibiotics presence of vascular, heart, kidney and lung disease in elderly hospitalized patients associated with the development of CDAD. Study Fraissea A. et al. (26) on a sample of 21 cases of CDAD in the elderly (mean 85.9 years) also showed that all the patients had severe underlying disease, and as risk factors of developing CDAD were determined administration of antibiotics (penicillin, cephalosporin and fluoroquinolone), protein malnutrition, immunodeficiency, and trails in the column. The study Beaujean D. et al. (27) found that patients with CDAD hospitalized longer than those without CDAD (39: 17.8 days). CDAD usually occurs during fourteenth day of hospitalization.

It is known that in cancer patients frequently occurring infections that require antibiotics and can not be reliably determine the importance of application of oncological therapy as risk factors for CDAD. Thus, the research Hornbucklea K. et al. (28) multivariate analysis are shown that previous hospitalization during the two months before the onset of CDAD, parenteral administration of vancomycin and low-level administration of cytostatics represent significant risk factors for the development of CDAD. The study Gifford A. et al. (29) identified the risk factors of developing CDAD in hospitalized cancer patients in age, lung cancer, antibiotics (cephalosporins), decrease in serum albumin and administration of interleukin-2. The study Blot E. et al. (30) have also studied the risk factors responsible for the occurrence of diarrhea and CDAD in cancer patients. As risk factors for the occurrence of diarrhea defined as age ($p = 0.03$) and the use of antibiotic therapy ($p = 0.008$). Targeted they were compared to patients with diarrhea and finding toksigenog C. difficile ($n = 21$) and patients with diarrhea and finding netoksigenog C. difficile as well as patients with diarrhea without finding C. diffic in stool ($n = 59\text{-}21 = 38$). Statistical analysis of these data revealed that the cytostatic chemotherapy and antibiotics are not a risk factor for the development of CDAD ($p = 0.02$).

Risk factors for the occurrence of CDAD in children (31) is the presence of severe underlying disease for which he was given an antibiotic and cytostatic chemotherapy, Crohn's disease, organ transplantation, immunodeficiency, and Hirschsprung's disease. It also suggests that premature birth, conditions that are accompanied by disruption in bowel habits and anatomical obstruction (stricture column) can influence the onset of CDAD.

Prevention of CDAD

The most successful have been shown to rationalization measures davnja antibiotics, training of medical staff, the use of disposable gloves, isolation of patients with CDAD in a separate room with a toilet, disinfection thermometer and use hipohlorata and aldehyde disinfection of hospital environment. Implementation of these measures led to a drop in the incidence of CDAD with 155 cases per year in the 67 rooms in intensive care hospital west coast of the United States (32).

References:

1. Bouza E, Munoz P, Alonso R. Clinical manifestations, tretment and control of infections caused by Clostridium difficile. Clin Mic Infec Dis 2005; 11:57-64.
2. Kuijper EJ, Coignard B, Tull P. Emergence of Clostridium difficile-associated disease in North America and Europe. Clin Microbiol Infect 2006; 12: 2-18.
3. Brayier JS, Role of the laboratory in investigations of Clostridium difficile diarrhea. Clin Infect Dis 1993; 4 (Suppl 1): 228-33.
4. Seppala K, Hjelt L, Sipponen P. Colonoscopy in the diagnosis of antibiotic-associated colitis. A prospective study. Scand J Gastroenterol 1981; 16: 465-8.
5. Guerrant RL, Araujo V, Soares E. Measurement of fecal lactoferrin as a marker of fecal leukocytes. J Clin Microbiol 1992; 30: 1238-42.
6. Lyerly DM, Barroso LA, Wilkins TD. Identification of the latex test-reactive protein of Clostridium difficile as glutamate dehydrogenase. J Clin Microbial 1991; 29: 2639-42.
7. Rifkin GD, Fekety FR, Silva Jr J. Antibiotic induced colitis. Implication of the toxin neutralized by Clostridium sordelli antitoxin. Lancet 1997; 2: 1103-6.
8. Shahrabadi MS, Bryan LE, Gaffney D, Coderre SE, Gordon R, Pai CH. Latex agglutination test for detection of Clostridium difficile toxin in stool samples. J Clin Microbiol 1984; 20: 339-41.
9. Kato N, Ou CY, Kato N, Luo CC, Ueno K. Detection of toxigenic Clostridium difficile in stool specimens by the polymerase chain reaction. J Infect Dis 1993; 167: 455-8.
10. Gumerlock PH, Tang YT, Weiss JB, Silva J. Specific detection of toxigenic strains of Clostridium difficile in clinical specimens. J Clin Microbiol 1993; 31: 507-11.
11. Cartmill TDI, Panigrahi H, Worsley MA, Mc Cann DC, Nice CN. Management and control of large outbreak of diarrhoea due to Clostridium difficile. J Hospital Infect 1994; 27: 1-15.
12. Brazier JS. Mulligan ME. Delmee M. Preliminary findings of the internacional typing study on Clostridium difficile. Clin infect Dis 1997; 25: 199-201.
13. Samore MH, Venkataraman L, DeGirolami PC, Arbeit RD, Karchmer AW. Clinical and molecular epidemiology of sporadic and clustered cases of nosocomial Clostridium diffcile diarrhea. Am J Med 1996; 100: 32-40.
14. van Dijack P, Avesani V, Delmee M. Genotyping of outbreak-related and sporadic isolates of Clostridium difficile belonging to serogroup C. J Clin Microbiol 1996; 34: 3049-55.
15. Barbut JS, Corthier G, Charpak Y, Cerf M, Fosse T. Prevalence and pathogenicity of Clostridium difficile in hospitalized patients. Ann Intern Med 1996; 16: 1449-54.
16. Brazier JS, Stubbs SL, Duerden BI. Prevalence of toxin A negative, toxin B positive Clostridium difficile strains. J Hosp Infect Dis 1999; 43: 248 - 9.
17. Al Saif N, Brazier JS. The distribucion of Clostridium difficile in the environment of South Wales. J Med Microbiol 1996; 45: 133-7.
18. Delmee M, Vandercam B, Avesani V. Epidemiology and prevention of Clostridium difficile infection in leukemia unit. Eur J Clin Microbiol 1987; 6: 623-7.
19. Brooks SE, Veal RO, Kramer M, Dore L, Schupf N, Adachi M. Reduction in the incidence of Clostridium diffcile-associated diarrhea in acute care hospital and a skilled nursing facility following replacement of electronic thermometers with single use disposable. Infect Control Hospital Epidemiol 1992; 13: 93 – 103.
20. Hirschhorn LR, Trnka Y, Lee MLT, Platt R. Epidemiology of community acquired Clostridium difficile-associated diarrhea. J Infect Dis 1994; 169: 127-33.

21. Vesta KS, Wells P, Gentry CA, Stipek WJ. Specific risk factors for Clostridium difficile-associated diarrhea: a prospective, multicenter, case control evaluation. Am J Infect Control 2005; 33(8): 469–72.
22. Raveh D, Rabinowictz B, Breuer G, Rudenky B. Risk factors for Clostridium difficile toxin-positive nosocomial diarrhea. Int J Antimicrob Agents 2006; 28(3): 231-7.
23. Garey KW, Dao-Tran T, Jiang Z, Price M, Gentry L, Dupont H. A clinical risk index for Clostridium difficile infection in hospitalised patients receving broad-spectrum antibiotics. J Hosp Infect 2008; 70(2): 142-7.
24. Al-Eidan FA, McElnay JC, Scott MG, Kearney MP. Clostridium difficile – associated diarrhoea in hospitalised patients. J Clin Pharm Ther 2000; 25: 101- 9.
25. Ackermann G. Risc factors for Clostridium difficile infection during an outbreak situation on a geriatric ward. European Society of Clinical Microbiology and Infections diseases (apstract). 14th European congres of Clinical microbiology and infectionus diseases; Prague/Czech,may 1/4, 2004; p 2084.
26. Fraisse A, Croix C, Maniere D, Pfitzenmeyer P. Clostridium difficile diarrhea in the very old. Clinical features and course in 21 cases. Presse Med 1999; 28(32): 1748-52.
27. Beaujean D, Blok H, Weersink A, Raymarkers J, Verhoef J. Surveillance of nosocomial infections in geriatric patients. J Hospi Infect 1997; 36(4): 275-84.
28. Hornbuckle K, Chak A, Lazarus HM, Cooper GS, Kutter LA, Sparano J, et al.. Determination and validacion of a predictive model for Clostridium difficile diarrhea in hospitalized oncology patients. Ann Oncol 1998; 9: 307 – 11.
29. Gifford AH, Kirkland B. Risk factors for Clostridium difficile - associated diarrhea on an adult hematology - oncology ward. Eur J Clin Microbiol Infect Dis 2006; 25: 751 – 5.
30. Blot E, Escande C, Besson D, Barbut F, Granpeix C, Asselain B, Falcou MC, Pouillart P. Outbreak of Clostridium difficile – related diarrhoea in a adult oncology unit: risk factors and microbiological characteristics. J Hospital Inf 2003; 53: 187 – 92.
31. Morinville V, McDonald J. Clostridium difficile-associated diarrhea in 200 Canadian children. Can J Gastroenterol 2005; 19(18): 497-50.
32. Zafar AB, Gaydos LA, FurlongWB, Mennonna PA. Effectivess of infection control program in controlling nosocomial Clostridium difficile. Am J Infec Control 1998; 26: 588-93.

11.30-12:30

ORAL PRESENTATIONS

1. CONFRONTING THE ANTI-VACCINISTS

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Objectives: 1. To assess the impact of local and regional anti-vaccination activities on the parental compliance to let their children vaccinated; 2. to suggest the means to neutralize adverse influence of anti-vaccinists ("anti-vaxxers").

Methods: Careful review of printed and electronic media.

Results: Motives of people and groups opposing vaccination may be classified as follows: 1. personal traumatic experience (usually inability to accept true causes of their child's handicap); 2. lucrative (crooks who promote their "mighty cures" instead of vaccines); 3. psychopathic (including uncritical self-promotion); 4. other (obsession with human rights, alternative medicine, religion, xenophobia, etc.). Anti-vaccinists' influence is often proportional to the absurdity of their concocted data as 'arguments'. Recently, they got regionally connected, better organized and much more aggressive, drawing media attention, distributing ready-made forms for refusing vaccination and circulating a petition for abandoning compulsory vaccination. As a result, the compliance is steadily decreasing.

Conclusion: Parents should be confronted with consequences of refusing vaccination, and "anti-vaxxers" have to be made legally responsible for spreading false information. Both doctors and prosecutors must insist that parental right to refuse vaccination has no more weight than the interest of the child to remain healthy and the interest of the social environment.

Key words: vaccination, immunization, anti-vaccinists, compliance

2.BINDING IMMUNIZATION OF CHILDREN IMMUNITY AS A WAY TO MAINTANCE OF COLLECTIVE IMMUNITY-PROS AND CONS

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The aim is to start an ethical debate on mandatory immunization, and highlight the importance of introducing additional recommended and optional immunizations.

Materials and Methods: Literature available on the Internet, descriptive method.

Results: In the countries of Europe, USA and Australia through history to the present day in a different way was attainable high immunization coverage. In a number of countries in Europe today do not apply the mandatory immunization, while still being implemented in the United States and Australia, with more frequent granting of exemptions, whether for religious reasons or conscientious objection. Contemporary ethical principles in public health and a discussion regarding immunization seek review stance on mandatory immunization for increasing the number of available vaccine to protect health. It is still legal protection of community health ahead of personal requests from individuals. New ethical questions are what to do in relation to parent who refuse to immunize their children or fail to immunize them, how to deal with the fact that immunization becomes an important item of the state budget in order to maintain the principle of justice in access to and availability of information about vaccination. Since the obligation is justified only in case of the failure of parents to vaccinate their child brings to a child at greater risk of contracting a serious illness, does that mean that all vaccines in the current program should be mandatory and to introduce new vaccines in the program? How and whether the state should compensate those who have suffered from immunization reaction? Legislation in the field of immunization in Serbia is very complex, because the vaccines are treated as drugs, and public procurement as a commodity, which requires compliance with more than 10 laws and more than 20 legal regulations. High activity of Anti Vaccine Movement in Serbia concludes this brief analysis of the contents of various websites available on the first ten pages of search engine "google" the word "vaccine" in August 2013. The high representation of websites that misinform the public and the information offered on these sites are not in line with WHO recommendations.

Conclusion: It is necessary to implement immunization against all diseases for which there are vaccines that are under the Law on Medicines registered in Serbia and introduce them in the Law on the protection of the population against infectious diseases. In addition to mandatory immunization, in this law should be defined the recommended and optional immunizations and how to implement ethical, and then a public hearing. It is necessary for the formation of an advisory body for immunization in Serbia which would be carried out regular professional and ethical debate. All views of this body should actively communicate over public health transferred to the public, and by the new communication strategy needs to come up to social networks.

Keywords: Immunization, Vaccination, Compulsory, Ethics

3. KNOWLEDGE AND ATTITUDES OF PRESCHOOL CHILDREN PARENTS ABOUT VACCINES AND DISEASES PREVENTED BY VACCINES

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Introduction: Vaccination is the most effective measure of primary prevention against infectious diseases that are most common in preschool children.

The aim of this study was to analyze the knowledge and attitudes of parents of preschool children about diseases prevented by vaccines and vaccines. Materials and Methods: The study was conducted as a cross sectional study on a randomly selected representative sample. The sample consisted of parents of children aged 1-6 years from nine kindergartens in the city of Nis. The survey was conducted in 2011. An anonymous survey was administrated among parents.

Results: Of the 1,000 distributed surveys 772 were completed, response rate was 77.2%. From the total number 523 (67.7%) knew to specify at least one infectious disease against which their child has been vaccinated. 502 (96%) of parents know that vaccination is compulsory by law. Only 14 (2.6%) believed that it is better that the child's immunization decide for itself. 718 (94.6%) of parents think that vaccines are important for the health of their children and it is better to get the vaccine than to get sick. 632 (82.3%) of parents felt that pediatricians are most qualified to speak about vaccines. 450 (58.4%) think that the main reason why parents is do not bring children to vaccination is the fear, 211 (27.4%) ignorance, and 64 (8.3%) lack of information. 634 (83.1%) said that vaccines are not harmful to health. Most of the parents (90.1%) will be informed about vaccines from the press, on television and radio. 254 (34.1%) purchased the vaccine, as recommended by the pediatrician. 122 (15.8%) of parents said they would not allow their child to receive some of the vaccines.

Conclusion: Parents have confidence in vaccines that are applied for a long as in health care workers. It is essential that health care professionals increase communication with parents about vaccines by introducing special call-centers or through official websites of medical institutions, e-mails.

Keywords: knowledge, attitudes, parents, vaccines

4. *ESCHERICHIA COLI* O104:H4 OUTBREAK IN GERMANY —CLARIFICATION OF THE ORIGIN EPIDEMIC

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Objectives: In 2011, Germany was hit by one of its largest outbreaks of acute gastroenteritis and haemolytic uraemic syndrome caused by a new emerging enterohaemorrhagic Escherichia coli O104:H4 strain. The German Haemolytic Uraemic Syndrome/Enterohaemorrhagic E. coli (GHUSEC) outbreak had unusual microbiological, infectiological and epidemiological features and its origin is still only partially solved. The aim of this article is to contribute to the clarification of the origin of the epidemic.

Materials and Methods: To retrospectively assess whether the GHUSEC outbreak was natural, accidental or a deliberate one, we analysed it according to three published scoring and differentiation models. Data for application of these models were obtained by literature review in the database Medline for the period 2011–13.

Results: The analysis of the unusual GHUSEC outbreak shows that the present official assumption of its natural origin is questionable and pointed out to a probability that the

pathogen could have also been introduced accidentally or intentionally in the food chain.

Conclusion: The possibility of an accidental or deliberate epidemic should not be discarded. Further epidemiological, microbiological and forensic analyses are needed to clarify the GHUSEC outbreak.

Key words: *Escherichia coli* O104:H4, outbreak, *Enterohaemorrhagic E. coli*, origin of the epidemic, Haemolytic Uraemic Syndrome

5. OUTBREAKS OF HEPATITIS A IN SERBIAN ARMED FORCES, 1991-2010

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Introduction/Aim: Hepatitis A has a long history as a militarily important disease. Epidemics of hepatitis A have threatened many wartime operations, particularly in highly endemic areas and during unstable field conditions. Risk factors for hepatitis A outbreaks in military units are crowded living conditions, substandard personal and unit hygiene practices under field conditions, mass food processing facilities and frequent movement of personnel among units and throughout various geographic locations.

The purpose of the current report was to summarize and characterize hepatitis A outbreaks in the Serbian Armed Forces (SAF) from 1991 to 2010.

Method: This study was a retrospective analysis of epidemiological reports, gathered by the Institute of epidemiology Military Medical Academy, representing all reported outbreaks of Hepatitis A in the SAF between 1991 and 2010.

Results: Total of 22 outbreaks was reported during study period. The greatest numbers (4 outbreaks) occurred in 1994 and 1999 but the largest, with biggest number of cases, were recorded in 1991 (two outbreaks with total of 111 cases). Total number of cases was 268. Number of cases per outbreak ranged from 3 to 100 and average number was 12. Most outbreaks (68.2%) had less than 10 cases. Attack rates in outbreaks ranged from 1.1% to 71.4% with mean attack rate of 16.0%. Outbreaks last from 1 to 99 days (average duration of outbreak was 50.8). Majority of outbreaks occurred during late summer and autumn, with maximum in October (4 outbreaks). Most frequent mode of transmission in outbreaks was contact (40.9%), then food (22.7%), unidentified (22.7%) and water (13.6%). Largest percentage of outbreaks (50%) occurred on territory of Kosovo and Metohia.

Conclusion: There is significant risk of outbreaks of hepatitis A among members of the military especially during the war, humanitarian disasters or engaging in multinational peacekeeping operations, therefore compulsory vaccination against Hepatitis A should be introduced for all military personnel.

Key words: military, outbreaks, hepatitis A, epidemiology

6. HOSPITAL INFECTIONS IN CLINICAL CENTER NIS IN THE PERIOD 2008-2013

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Introduction: Hospital infection is the one that occurred in the hospital and became evident 48 hours after admission of the patient to the hospital and later on, or if it is found associated with surgical intervention and manifested after 30 days after the intervention, if not impants have not been installed, resp, or one year if imlantant has been installed.

Goals: To review the frequency of occurrence of hospital infections at Clinical Center Nis, the localization of the most frequent causes as well as their resistance in the period of 2008-2013.

Material and Methods: The descriptive method. As a source of data, the application of hospital infections and annual reports PHI Nis and protocols Center for Microbiology PHI Nis.

Results: In the period from 2008 to 2013, 899 hospital infections have been reported. The greatest number of hospital infections have been reported by surgical clinics (general surgery, vascular and neurosurgery), while a small number of applications were from general internal areas. The most common localization of hospital infections are surgical site infections (47,7%), followed by following infection of the respiratory system (13.7%) and infections of the digestive system (10.6%). Infections of the eye, nose and throat, as well as cardio vascular system were not registered.

The causes of hospital infections have not been significantly changed except that they are becoming more and more resistant, so they are now the most common MRSA, ESBL strains of Klebsiella, E. coli, and Acinetobacter. Outbreake of Clostridium difficile is the most common cause of hospital infections. In the observed period there were 9 hospitalized outbreaks. There have not been recorded any deaths.

Conclusion: Over the years the number of hospital infections is growing.Infections of surgical site were the most common, although there is an increasing number of infections of the digestive tract where the cause of Clostridium difficile, which is a big hospital problem. MRSA and ESBL strains are the most common causes of surgical site infections and respiratory system. As a consequence the number of days of hospitalization is lenghtened and therefore the possibility for the maintenance and expansion of hospital infections. There is a smaller range of medicines to treat the growing resistance of pathogens.

Keywords: hospital infections, hospital infections cause, resistance, nosocomial outbreaks

7. EPIDEMIOLOGICAL CHARACTERISTICS OF INFECTIOUS DISEASE MORTALITY IN THE TERRITORY OF NISAVA AND TOPLICA DISTRICTS

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The aim of this paper is to show the trend and epidemiological characteristics of mortality from infectious diseases in the territory Nisava and Toplica region in the period from 2004 to 2013.

As materials were used: the report – unsubscribe of communicable diseases from Nisava and Toplica district from 2004 to 2013 and annual reports PHI Niš. A descriptive epidemiological method was used. Rates are non-standardized and are calculated per 100,000 inhabitants.

Results in the observed period there have been 630 cases of infectious disease with fatal outcome. Reported cases belong to all groups of infectious diseases. In the first place are respiratory infectious diseases with 51.59%. Mortality trend is on the rise and is y = 17.27 + 8,31x and R2 = 0.64. The average annual mortality rate was 12.71% ooo, and lethality 0.48%. The highest mortality rate is 2013. (22.31% ooo) and the lowest 2004 to 1.00% ooo. Lethality is the biggest of 2012 (0.91%) and the lowest in 2004. (0.06%). Pneumonia viralis non specificata is in the first place with 27.14% of the total mortality from infectious diseases, while septicemia is in the second place with 26.19%. Municipality of Razanj has the highest average annual mortality rate (17.11% ooo), followed by municipalities Aleksinac (17.04% ooo) and Niš (13.72% ooo), and the municipality Sokobanja has the smallest (4.74% ooo). Males had more fatal outcomes (365 265) and a higher mortality rate (152.83% ooo: 108.03% ooo) compared to the female gender. In both sexes, the highest mortality rate was in the age group of 60 years and over. In March has been registred the highest number of patients - 10,63%.

Conclusion: The territory of Nisava and Toplica districts experienced growth in mortality from infectious diseases. The most vulnerable population are the older-aged males. The emergence of new infectious diseases, as well as the uncontrolled use of antibiotics leads to the emergence of bacterial resistance to the medicines and the occurrence of complications, may contribute to a further increase in mortality from infectious diseases.

Keywords: mortality, lethality, infectious diseases, trend

POSTER PRESENTATIONS

1. OUTBREAKS OF SALMONELLOSIS IN THE POPULATION OF BELGRADE FOR THE 1994-2013 PERIOD

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Introduction. Salmonellosis is an important global public health problem causing significant morbidity. The aim of this study was to analyze outbreaks of salmonellosis in the population of Belgrade for the period 1994-2013.
Method. The study applied a descriptive epidemiological study. The analysis outbreaks of salmonellosis were used data from the annual reports on the work of the prevention, combating and elimination of infectious diseases and the results of epidemiological and laboratory investigation.
Results. During the period covered in the Belgrade area were registered 273 outbreaks of salmonellosis with a total of 4425 affected individuals. The largest number of outbreaks (249) took place in the outpatient environment where affected total 4026 persons (91%) and 24 outbreaks (399 patients) in the hospital environment. Two-thirds of all registered outbreaks are family epidemics (63.37%). The most common mode of transmission in outbreaks of salmonellosis was through food (94.50%). The average duration of outbreaks was 6 days. The most common cause of outbreaks of salmonellosis were S. enteritidis (89.09%).
Conclusion. In order to reduce the number of recorded outbreaks of salmonellosis it is necessary to improve control over all facilities for the preparation and distribution of food.

Keywords: salmonellosis, outbreaks, S. enteritidis

2. EPIDEMIOLOGICAL CHARACTERISTICS OF TB IN MONTENEGRO IN THE 2004-2013 PERIOD

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Introduction: Tuberculosis continues to be a major public health problem in both developed and developing countries as one-third of the world´s population is infected with Mycobacterium tuberculosis.

Aim: To describe the epidemiology of tuberculosis in Montenegro between 2004 and 2013 and identify more susceptible populations.

Materials and methods: Data source were the National TB Registry and the Statistical Office of Montenegro-Cencus of Population. In the analysis of the data we used crude incidence rates and descriptive statistics.

Results: The highest TB incidence rate was in 2006 - 27,5/100 000 while the lowest was in 2012.-17,2/100 000. During the observing period 61% of the cases were among men. The highest average incidence rate was recorded among the age group of over 64 and it was 42,6/100 000. In ten-year period extrapulmonary tuberculosis constitutes up to 12-14% of all cases. During the observing period 4 persons with HIV/TB were registered.

Conclusions: In the last ten years there has been stagnation in sudden onset of tuberculosis in Montenegro. Despite the decrese in incidence rate in Montenegro, there are still many challenges in the control of TB, as early detection of cases, diagnostic and successful treatment.

Key words: TB, epidemiology, burden, incidence

3. EPIDEMIOLOGICAL ASPECTS OF COLLECTIVE CONSUMPTION IN KICEVO REGION WITHIN 2006-2012

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Objective: To assess the security risk of collective consumption in Kicevo to provide preventive measures proposed to reduce the risk of infectious diseases transmitted by food.

Materials and methods: Used statistical information data epidemiological inspections carried out in facilities for collective consumption,control of microbiological purity,control of hygienic quality of food that is prepared according to Regulation Food Safety and food safety criteria for microbiological Fig.R.M. no.78/2008.Retrospective statistical method used to work,and results will be presented tabular and graphic.

Results: Performed a number of epidemiological inspections facilities for insights into collective consumption(190),examined 407 samples of food for bacteriological analysis,2108 samples of drinking water from the city water supply and all corresponding regulations.Of the 345 bacterial swabs bacteria isolated 8(2%),while in the period 2001-2005y.out of 294 had a greater number of defective samples 40(14%),total 361 meals tested were bacteriological defective 3%.The number of ill of alimentary toxicinfections goes from 36 in 1996y., 201 in 2000y. to 1 in 2012y.

Conclusion: The examined period of 2006-2012y. situation improved in general satisfies.The percentage of defective bacterial smears decreased from 14% to 2%,and food from 3% to 0%.It’s necessary to respect the principles of the HACCP system.Alimentary toxicinfections are decreasing in Kicevo.

Keywords: Epidemiological inspections, collective food,alimentary toxic infections.

4. WHAT ARE THE MOST SIGNIFICANT FACTORS THAT CONTRIBUTED TO HIV/AIDS BECOMING A GLOBAL PROBLEM?

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Objectives:

HIV/AIDS is not just a health problem, but also a development problem. By spreading fast mostly to young people and working-age adults, HIV/AIDS affects the economy, society, family and schooling in a country, weakening the country as a whole.

Materials and methods:

In our work w'll try to give an answer to the following question (using the available data) why HIV/AIDS becoming a most important global health problem?

Results:

HIV-1 is transmitted in body fluids. The most important factors that contribute to the epidemic of HIV infection are: Low socio-economic status, lack of realistic estimates of the size of vulnerable groups, insufficient coverage of key preventive activities populations.

Conclusion: Today, with modern medical advances, AIDS doesn't have to be a death sentence. To people who living in the developed world with adequate resources and access, HIV has more often become a chronic illness that can be managed for years. But in Africa, the World Health Organization estimates that only 28% of those in need of treatment are getting it. International efforts have produced results, but still have a long way to go.

Key words: HIV/AIDS1, global problem 2, transmition 3, body fluids4, death sentence5

5. THE EPIDEMIC OF TULAREMIA IN VILLAGE VRAPCHISHTE-MUNICIPALITY GOSTIVAR

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Purpose: The purpose of this work is to show the occurrence of the disease tularemia, which for the first time appeared in epidemic form, not only in the village Vrapchishte, but and in the region in Gostivar, with special emphasis on the reasons for the occurrence of this zoonotic diseases and measures to prevent and combating this epidemic.

Materials and Methods: There were used individual applications for infectious diseases, epidemiological surveys of patients, the analysis of biological materials, patterns of water, reports, newsletters and information created within the epidemiological department in Gostivar.

Results: Since the beginning of the epidemic until its end, were interviewed 40 ill persons with symptoms suspicious for tularemia. The same number (40) of serums samples were tested for the disease. The positive result of tularemia showed 20 patients. The largest part of the 19 patients or 90% were from the village Vrapchishte, one or 5% of the village Zubovce one or 5 % of the village of Galate. In this epidemic were 11 ill men and 9 ill women. The greatest part were the age of 40-49 (7 patients), followed by persons 20-29 years of age (4 patients), and three children ages 10-19 and a child of 3 years.

Conclusion: This epidemic is the second time registered in the Republic of Macedonia (the first recorded epidemic was in the year 1995 with 31 ill). Although we were unable to confirm the source of infection, with great certainty, we believe that these were the squirrels, which we found in the tank with water from the local water supply to all three villages, and the water was a way of spreading this infectious disease.

Keywords: tularemia, squirrels, water

6. EPIDEMIOLOGICAL CHARACTERISTICS OF THE SALMONELLOSIS AMONG THE FOODBORNE DISEASES IN MONTENEGRO IN THE 2004-2013 PERIOD

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Introduction: Salmonellosis is acute, bacterial, intestinal infection with short incubation period, clinical presentation of the gastroenteritis and general intoxication.

Aim: Research epidemiological characteristics of the Salmonellosis among the foodborne diseases in Montenegro in 2004-2013.

Materials and method: Data source were reporting cards for communicable diseases and epidemiological questionnaires and Census of Population- Statistical Office of Montenegro. In the analysis of the data we used crude incidence rates and descriptive statistics.

Results: In observing period 22,931 cases of foodborne diseases were registered (average incidence was 369.84/100,000), and 3,177 registered cases of Salmonellosis (Incidence of 51.24/100,000) or 13.85%. Higher average Salmonellosis incidence rate was recorded in Pljevlja (160.46/100,000), Budva (144.14/100,000), Kotor (62.82/100,000). Of all registered cases 67.5% were among preschool and school age group. The most common serotype is Salmonella Enteritidis - 85%.

Conclusion: Number of Salmonellosis cases is probably higher than number of registered cases, considering the great number of cases of acute gastroenterocolitis. Higher incidence in named municipalities is explained with higher frequency of people and higher temperatures in summer months. The highest number of registered cases among the youngest is explained with sensitivity of these age groups and more frequent visits to doctors.

Key words: Salmonella, Epidemiology, Incidence, Montenegro

7. INTESTINAL INFECTIOUS DISEASES IN SERBIAN AREAS OF KOSOVO AND METOHIJA

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Objective: The main objective of this paper is to identify the most important epidemiological characteristics of intestinal infectious diseases in the Serbian areas of Kosovo and Metohija.

Materials and methods: In this research we used epidemiological study design (cross-sectional). As a material for the understanding of the size of the problem of intestinal infectious diseases and inference we used data from the monthly and annual reports on the movement of infectious diseases of the Public Health Pristina in Kosovska Mitrovica. The study covered the period from 2004 to 2013. year.

Results: In the observed period the Serbian areas of Kosovo and Metohija was a total of 6238 patients with intestinal infectious diseases, with an average incidence 398.35 / 100 000. For the same period was recorded 21 outbreaks with a total of 327 patients. Analyzing the disease from the group of intestinal infectious diseases, which are most frequent, enterocolitis acuta ranks first with registered 4987 (80%) patients. Statistically significant intestinal infectious diseases were more prevalent in males (chi-square 14.973, p = 0.005). Disease showed a seasonal character and connection with the summer months, except that VHA was more common during the fall and winter.

Conclusion: Intestinal infectious diseases in the Serbian areas of Kosovo and Metohija are the actual health problem and needs to work on strengthening preventive measures.

Keywords: intestinal infectious diseases, Kosovo and Metohija, enterocolitis acuta

8. EPIDEMIOLOGICAL CHARACTERISTICS OF BRUCELLOSIS IN THE REGION OF PRILEP FOR THE PERIOD 1986-2013

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Objective: Review of epidemiological characteristics of brucellosis in the region of Prilep for the period 1986-2013.

Materials and methods: Data from reports on the movement of contagious disorders, registration cards and surveys conducted with diseased persons have been used. This is a retrospective study in which both descriptive and analytical working methods have been applied.

Results: The first case of person infected with brucellosis in the region of Prilep was registered in 1986. By the end of 2013, 1023 infected persons were registered. Average annual morbidity rate is 37.3 in every 100 000. Brucellosis has shown a declining tendency since 2000. Morbidity rate of the rural population is higher that the one of the urban (92:18). By way of direct contact were infected 55.3%. Analysis conducted in different age groups revealed that people aged 50-59 most commonly become infected (morbidity rate 52.4/100 000). The greatest part of infected persons is registered in June (15.7%).

Conclusion: Brucellosis has been present in the region of Prilep since 1986. There has been a declining tendency for the last 10 years. Brucellosis is an occupational disorder. Transmission by way of contact is a dominant one. People aged 50-59 are most commonly become infected.

Keywords: brucellosis, morbidity rate, infection

SESSION:EPIDEMIOLOGICAL CHARACTERISTICS AND IMPORTANCE OF MASS CHRONICAL DISEASES

INTRODUCTORY LECTURES

1. OSTEOPOROSIS IN RHEUMATIC DISEASES: EPIDMIOLOGY, PREVETION AND TREATMENT

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Introduction

Osteoporosis (OP) is one of the major causes of morbidity in rheumatic diseases, besides cardiovascular and neoplastic pathologies. It complicates either inflammatory rheumatic diseases and connective tissue diseases.In these pathologies OP is principally related to the release of the inflammatory mediators that up regulate bone resorption and down-regulate bone formation.Moreover, important risk factors associated with OP in rheumatic diseases are the glucocorticoid therapy and reduced physical activity.

Epidemiology

Inflammatory arthropathies

R*heumatoid arthritis (RA):*

OPis major extra-articular complication of long-standing RA. Anti-citrullinated peptide positivity as well as higher levels of interleukin-6 is associated with decreased bone mineral density (BMD) and polymorphisms in the vitamin D receptor in RA patients may predispose to OP (**1**).OP is more frequent in RA patients than in the healthy population, with about double rate (**2**).In patients with longstanding RA the occurrence of OP ranges from 19% to 32% in the spine and from 7% to 26% in the hip (**2,3,4**).Moreover, patients affected by RA have a 1.5 fold higher risk of osteoporotic fractures compared to healthy controls (**5**).

Ankylosing spondilytis(AS) and Psoriatic arthritis (PA):

Low bone mineral density (BMD) and bone loss have been well documented in the spine and hipsof patients with AS (**6**).Low BMD has been found in the early stages of the disease, whereasin long-standing AS the presence of structural bone lesions, such as syndesmophytes and periosteal bone formation, may be responsible for alterations in bone density scan (DXA) measurements (**7**). In patients with long-standing AS, the prevalence of vertebral fractures ranges between 1% and 19% (**8,9**). In patients affected both by AS and OP, the prevalence of vertebral fractures ranges between 29.6% and 33.3% (**9**).

Data on prevalence of OP in PA are contrasting. Some studies showed lower BMD levels in patientsaffected by PA compared to healthy controls (**10**) and BMD values of lumbar spine and total femur showed an inverse correlation with the duration of arthritis (**11**). These results were not confirmed by other studies that have notfound a reduction in the bone mass in patients affected by PA (**12,13**), showing also no correlation between duration of the disease and BMD (**14**).

Connective tissue diseases

Systemic lupus erythematosus(SLE):

Low BMD and a high prevalence of vertebral and peripheral fractures have been reportedin patients affected by SLE.The prevalence of OP in SLE ranges from 1.4 to 68%, while the prevalence ofsymptomatic fractures since lupus diagnosis ranges from 6 to 12.5%(**15**).This wide range is probably due to the differences between different study populations, regarding disease activity, ethnicity, age, sex, size and treatment.

Besides the chronic inflammation, other risk factors for OP in SLE are represented by: glucocorticoid treatment, hypovitaminosis D, reduced physical activity due tojoint and muscular involvement. Patients with SLE have high prevalence of hypovitaminosis D as a result of reduced sun exposure due to photosensitivity, renal insufficiency and the use of medications such as anticonvulsants, antimalarials and the calcineurin inhibitors, which alter the metabolism of vitamin D or downregulate the functions of the vitamin D receptor. Moreover, these patients are at higher risk for falls, due to neurological and musculoskeletal involvement and visual defects, and are consequently exposed to higher fracture risk.

Systemic sclerosis (SSc) and Polymiositis/Dermatomyositis (PM/DM):

Numerous studies reported a high prevalence of OP in SSc withBMD values similar to or even lower than those of patients with RA (**16,17**). Arecent casecontrol study showed a higher prevalence of OP and vertebral fractures in postmenopausal women with SSc compared to the control group (**18**). Risk factors for OP in SSc are represented by: intestinal malabsorption, reduced physical activity, low body mass index, renal impairment and vitamin D deficiency.

An increased risk of OP in adult PM/DM patients has been reported recently (**19**), and it is probably related to glucocorticoid treatment and low physical activity due to the muscular impairment.

Increased prevalence of OP has been described in other rheumatic diseases as polymyalgia rheumatic and giant cell arteritis (**20**)and ANCA (anti-neutrophil cytoplasmic antibodies)-associated vasculitis (**21**).

Prevention and treatment

The prevention of OP in rheumatic diseases should be initiallyperformedby:

- optimal disease control in order to avoid the release of inflammatory mediators and cytokines that promote OP

- minimization of use of glucocorticoids, using also steroid sparing agents (eg. Methotrexate and other immunosuppressants)

- adequate supplementation of calcium and vitamin D
- physical activity and adequate exercise
- good nutrition and maintenance of normal body weight
- avoidance of smoking and alcohol

The timing of the pharmacological anti-osteoporotic intervention should be based on the individual absolute risk of fracture. The World Health Organization developed the FRAX® computer- based fracture risk-assessment tool (http://www.shef.ac.uk/FRAX) to calculate a 10-year probability of hip fracture or a major osteoporotic fracture, starting from clinical risk factors with or without BMD testing .It considers the following variables: age, sex, weight, height, history of fractures, parental history of hip fractures, current smoking, consume of alcohol $\geq$ 3 units/day, use of glucocorticoids, presence of rheumatoid arthritis, secondary osteoporosis and femoral neck BMD.

Italian experience: DeFRA algorithm

Although the FRAX tool represents a major step forward in the management of OP, it has some limitations. This led the Italian Society of Osteoporosis Mineral Metabolism and Skeletal Diseases (SIOMMMS) to develop a new tool (DeFRA; https://defra-osteoporosi.it) based on the data published for the development of FRAX and yielding almost superimposable results (**22**).

DeFRA (FRAX derivate) is the algorithm used currently by Italian rheumatologists and its gives the possibility to register data of each patient. It takes in consideration the same clinical risk factors used by Frax, but with a possibility to detail some of them. FRAX permits to give two answers on use of steroids.

DeFRA defines better the chronical use of steroids; it gives the possibility to specify if the daily dose of glucocorticoids is superior or inferior than 5 mg of prednisone equivalent. As regards the personal history of fractures, DeFRA permits to insert if there is one or more than one fracture, while FRAX gives the possibility to wright yes or no. Eventually, FRAX defines only the presence or absence of current cigarette smoking as a risk factor for OP, while DeFRA gives the possibility to diversify if the daily quantity of cigarette is superior or inferior than 10. These improvements of FRAX algorithm may allow to estimate better the influence of the osteoporotic risk factors on risk of fractures, according to their intensity.

Treatment of OP in rheumatic disease follows the general principles of osteoporotic therapy used in other settings.Management of glucocorticoid-induced osteoporosis (GIO) is one of the major clinical challengesin rheumatic diseases, due to a widespread use of steroids. A treatment with 10 mg/d of prednisone or equivalent for more than 3 months leads to a 7-fold increase in hip fractures and a 17-fold increase in vertebral fractures (**23**).For this reason, the attention of a section on prevention and treatment of OP will be focused on GIO.

As regards the prevention of GIO, when a patient starts a glucocorticoid treatment which is intended to last at least 3 months, adequate prevention measures against fractures need to be adopted.The same applies to patients already on glucocorticoids.Thresholds for cost-effectiveness have been developed on the basis of economic assumptions that are country-specific.

The most recent recommendations from the AmericanCollege of Rheumatology (ACR) are stratified by glucocorticoid dose and fracture risk based on FRAX calculations (**24**). They divided patients at risk of OP in those at low (FRAX 10-year risk of a major fracture <10%), medium (FRAX 10-year risk of major fracture 10-20%) and high risk (FRAX > 20%). Postmenopausal women and men aged 50 and older at low-risk should be treated if their steroid doseis ≥7.5 mg/day and steroid use lasts or is expected to last more than 3 months.Medium-risk patients should be treated in case of prolonged steroid therapy (> 3 months) at dosage <7.5 mg, while high-risk patients should be treated for any duration and dose of glucocorticoids.The FRAX tool is currently not applicable to premenopausal women or men younger than age 40 years.

As regards premenopausal women and men younger than 50, the decision is based on previous fractures. For patients without previous fractures, no recommendation was formulated, due to a limited data on this subset of patients. In man < 50 years or in premenopausal women with no childbearing potential who have had a fracture, treatment is indicated if the patient has received glucocorticoids at any dose for longer than 3 months, or if the steroid dose is≥ 5 mg/day for 1 to 3 months.In premenopausal women with childbearing potential the potential fetal toxicity of bisphosphonates should be consider, recommending to avoid the use of zolendronate due to its long half-life.

A joint Guideline Working Group of the International Osteoporosis Foundation (IOF) and the European Calcified Tissue Society (ECTS) has recently published a framework for the development of national

guidelines for the management of GIO (**25**). In postmenopausal women and men aged ≥50 years exposed to ≥3 months of oral glucocorticoids it recommends to consider the treatment in case of previous fracture, age > 70 or steroid dose≥7.5 mg/day. Otherwise, a decision should be made by assessing risk with adjusted FRAX (with or without BMD testing). Intervention thresholds based on FRAX will also depend on the country. In premenopausal women and men aged <50 years exposed to ≥3 months of oral steroids, treatment should be considered in patients with prior fracture. Treatment decisions in individuals with no prior fracture should be based on clinicaljudgment.

Besides calcium and vitamin D supplementation, bisphosphonates are considered first-line options for GIO (**24**). Alendronate, risedronate, and zoledronic acid are recommended by the guidelines, as showed to reduce the risk of vertebral fractures(**26**).An alternative GIO treatment is teriparatide,a recombinant human parathyroid hormone, that showed to increase spinal BMD faster and to a greater extent than alendronateand also to reduce vertebral fractures (**27**). Teriparatide represents a rationalapproach to GIO, because it contrasts some fundamental effects of glucocorticoids on bone, as anincrease in osteoblast and osteocyte apoptosis and the decrease in the number of osteoblasts. Another potential treatment option is denosumab, a humanized monoclonal antibody to RANKL, approved for the fracture prevention in postmenopausal OP, but not yet for GIO. It showed some promising results in patients withRAreceiving glucocorticoid treatment ad dosage lower than 15 mg/day ofprednison (**28**). Denosumabmay be considered for glucocorticoid-treated patients with contraindications for bisphosphonates or teriparatide.

Conclusions

OP is one of the major complications of rheumatic diseases. Treatment with glucocorticoidsrepresent one of the main osteoporotic risk factors in these patients, besides chronic inflammation, vitamin D deficiency and reduced mobility.

Treatment and prevention of OP should be based on national and international guidelines, but has to be personalized, taking into accountpotential side effects and cost-effectiveness. Decisional algorithms, as FRAX or Italian version DeFRA, should be used in everyday clinical practice. Recommendations for prevention and treatment of OP in premenopausal women and young men should be implemented.

References

1. Clayton ES, Hochberg MC, Osteoporosis and osteoarthritis, rheumatoid arthritis and spondylarthropathies.CurrOsteoporos Rep. 2013;11(4):257-62

2. Haugeberg G, Uhlig T, Falch JA, Halse JI,Kvien TK. Bone mineral density and frequencyof osteoporosis in female patientswith rheumatoid arthritis: results from 394patients in the Oslo County RheumatoidArthritis register. Arthritis Rheum. 2000; 43: 522-30

3. Forsblad DH, Larsen A, Waltbrand E, KvistG, Mellstrom D, Saxne T, et al. Radiographicjoint destruction in postmenopausalrheumatoid arthritis is strongly associate with generalised osteoporosis. Ann Rheum Dis. 2003; 62: 617-23

4. Lodder MC, de Jong Z, Kostense PJ, Mo lenaar ET, Staal K, Voskuyl AE, et al. Bonemineral density in patients with rheumatoidarthritis: relation between disease severityand low bone mineral density. Ann Rheum Dis. 2004; 63: 1576-80

5. van Staa TP, Geusens P, Bijlsma JW,Leufkens HG, Cooper C. Clinical assessmentof the long-term risk of fracture inpatients with rheumatoid arthritis. ArthritisRheum. 2006; 54: 3104-12Schett G, Saag KG, Bijlsma JWJ. From bonebiology to clinical outcome: state of the artand future perspectives. Ann Rheum Dis.2010; 69: 1415-9

6. Lange U, Kluge A, Strunk J, Teichmann J. Bachmann, G. Ankylosing spondylitis and bone mineral density-what is the ideal tool for measurement? RheumatolInt (2005) 26: 115–120

7. Sambrook PN, Geusens P. The epidemiologyof osteoporosis and fractures in ankylosingspondylitis. TherAdvMusculoskelet Dis.2012; 4: 287-92

8. Mitra D, Elvins DM, Speden DJ, Collins AJ.The prevalence of vertebral fractures in mildankylosing spondylitis and their relationshipto bone mineral density. Rheumatology (Oxford). 2000; 39: 85-9

9. Ghozlani I, Ghazi M, Nouijai A, Mounach A,Rezqi A, Achemlal L. et al. Prevalence andrisk factors of osteoporosis and vertebral fracturein patients with ankylosing spondylitis. Bone, 2009, 44:772–776

10. Frediani B, Allegri A, Falsetti P, Storri L, BisognoS, Baldi F, et al. Bone mineral density in patients with psoriatic arthritis. J Rheumatol.2001, 28: 138-43

11. Borman P, Babaog˘lu S, Gur G, Bingol S,Bodur H. Bone mineral density and boneturnover in patients with psoriatic arthritis.ClinRheumatol. 2008; 27: 443-7

12. Pedreira PG, Pinheiro MM, Szejnfeld VL.Bone mineral density and body compositionin postmenopausal women with psoriasisand psoriatic arthritis. Arthritis Res Ther.2011;13: R16

13. Riesco M1, Manzano F, Font P, García A, Nolla JM. Osteoporosis in psoriatic arthritis: an assessment of densitometry and fragility fracturesClinRheumatol. 2013;32(12):1799-804

14. Dheda K, Cassim B, Patel N, Mody GM. Acomparison of bone mineral density in Indianswith

psoriatic polyarthritis and healthyIndian volunteers. ClinRheumatol. 2004; 23: 89

15. Bultink IE. Osteoporosis and fractures in systemiclupus erythematosus. Arthritis CareRes (Hoboken). 2012; 64: 2-8

16. Avouac J, Koumakis E, Toth E, Meunier M, Maury E, Kahan A, et al. Increased risk of osteoporosis and fracture in women with systemic sclerosis: a comparative study with rheumatoid arthritis. Arthritis Care Res (Hoboken).2012; 64: 1871-8

17. Mok CC, Chan PT, Chan KL, Ma KM. Prevalenceand risk factors of low bone mineraldensity in Chinese patients with systemicsclerosis: a case-control study. Rheumatology(Oxford). 2013; 52: 296-303

18. Atteritano M, Sorbara S, Bagnato G, MiceliG, Sangari D, Morgante S, et al. Bone mineral density, bone turnover markers andfractures in patients with systemic sclerosis:a case control study. PLoS One. 2013; 8:e66991

19. de Andrade DC, de Magalhães Souza SC, de Carvalho JF, Takayama L, Borges CT, AldrighiJM, et al. High frequency of osteoporosis and fractures in women with dermatomyositis/polymyositis. Rheumatol Int. 2012; 32:1549-53

20. Petri H, Nevitt A, Sarsour K, Napalkov P, Collinson N. Incidence of giant cell arteritis and characteristics of patients: Data-driven analysis of comorbidities.Arthritis Care Res (Hoboken). 2014: 10.1002

21. Robson J, Doll H, Suppiah R, Flossmann O, Harper L, Höglund P, Jayne D, Mahr A, Westman K, Luqmani R. Damage in the anca-associated vasculitides: long-term data from the European Vasculitis Study group (EUVAS) therapeutic trials. Ann Rheum Dis. 2013:10.1136

22. Adami S, Bianchi G, Brandi ML, Di Munno O, Frediani B, Gatti D et al. Validation and further development of the WHO 10-year fracture risk assessment tool in Italian postmenopausal women: project rationale and description.ClinExpRheumatol. 2010;28(4):561-70

23. Kanis JA, Johansson H, Oden A, Johnell O, deLaet C, Melton III LJ, et al. A meta-analysisof prior corticosteroid use and fracture risk. JBone Miner Res. 2004; 19: 893-9

24. Grossman JM, Gordon R, Ranganath VK,Deal C, Caplan L, Chen W, et al. AmericanCollege of Rheumatology 2010 recommendationsfor the prevention and treatment ofglucocorticoid-induced osteoporosis. ArthritisCare Res. 2010; 62: 1515-26

25. Lekawasam S, Adachi JD, Agnusdei D, BilezikianJ, Boonen S, Borgström F, et al. A framework for the development of guidelines forthe management of glucocorticoid-induced osteoporosis.Osteoporos Int. 2012; 23: 2257-76

26. Reid DM, Devogelaer JP, Saag K, Roux C,Lau CS, Reginster JY, et al. Zoledronic acidand risedronate in the prevention and treatmentof glucocorticoid-induced osteoporosis(HORIZON): a multicentre, double-blind,double-dummy, randomised controlled trial.Lancet. 2009; 373: 1253-63

27. Saag KG, Shane E, Boonen S, Marín F,Donley DW, Taylor KA, et al. Teriparatide oralendronate in glucocorticoid-inducedosteoporosis.NEngl J Med. 2007; 357: 2028-39

28. Dore RK, Cohen SB, Lane NE, Palmer W, Shergy W, Zhou L, et al. Effects of denosumabon bone mineral density and bone turnover inpatients with rheumatoid arthritis receivingconcurrent glucocorticoids or bisp bisphosphonates. Ann Rheum Dis. 2010; 69: 872-5

2. IMPORTANCE OF EARLY TREATMENT OF ISCHEMIC STROKE IN COMPLICATION PREVENTION

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3. INCIDENCE TREND OF MALIGNANT DISEASES IN THE MALE POPULATION IN THE CITY OF NIŠ

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Introduction: Malignant diseases are a very important public health problem.

Objective: To review the basic epidemiological features of male patients with malignant neoplasms in the city of Nis in the 1986-2010 period

Materials and methods: we used the official data of the Public Health Institute in Niš computer database CanReg 4 conducted at the Center for Disease Control and Prevention. A descriptive epidemiological method was utilized.

Results: In the period from 1986 to 2010 in the city of Nis there were 12253 new registered cases of men with malignant diseases. This number ranged from 203 (1994) to 818 (2004). According to the number of patients, the lowest incidence rate was registered in 1994 (less than 200/100000 of men), and highest in 2004 (close to 700 per 100,000 population). The trend of incidence rate was rising for about 16 new cases per 100 000 inhabitants. Statistically significant upward trend was observed in men in the age group of 50-54, 55-59, 65-69 and 70-74 years. Malignant lung tumors among men in the city of Nis in the period have expressed an increasing trend of about 3 patients per 100,000 people and a share of 20% in comparison to other malignant tumors.

Conclusion: Reducing the incidence of malignant neoplasms should be a priority in addressing this problem and should reduce the burden on our society, the mass disease.

4. INCIDENCE TREND OF MALIGNANT DISEASES IN THE FEMALE POPULATION IN THE CITY OF NIŠ

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Introduction: There were 14.1 million new cancer cases in 2012 worldwide. The overall age standardized cancer incidence rate is almost 25% higher in men than in women. Female rates are ranging from 103 per 100,000 in South-Central Asia to 295 per 100,000 in Northern America. In Central Serbia, female crude incidence rate was 469.7, while standardized incidence rate was 259.2, in 2011. Objectives: The aim of the study was to assess incidence trends of the malignant diseases among female population in the City of Niš, in the period 1986-2010. Materials and methods: Data used for analyses were provided by the Cancer Registry of the Public Health Institute, Niš. Trends of the crude incidence rates (per 100,000) were calculated. Results: In the study period, a total of 12510 new cases of malignant diseases in females were registered. The highest incidence rate was registered in 2004 (645.2), while the lowest rate was found in 1986 (220.0). There was an increasing tendency of linear trend of malignant diseases incidence rates ($y=12.885x+225.84$, $R^2=0.634$). During the entire period of observation, a increasing tendency of linear trend of incidence rates was registered among all age groups: 0-4 ($y=0.4824x+11.061$), 5-9 ($y=0.0052x+9.7544$), 10-14 ($y=0.445x+3.1643$), 15-19 ($y=0.1412x+12.783$), 20-24 ($y=0.6399x+19.417$), 25-29 ($1.2547x+20.308$), 30-34 ($1.9469x+75.003$), 35-39 ($y=3.0966x+132.68$), 40-44 ($y=6.869x+199.64$), 45-49 ($y=5.3237x+349.92$), 50-54 ($y=16.537x+362.44$), 55-59 ($y=18.707x+515.69$), 60-64 ($y= 7.4891x+790.14$), 65-69 ($y=22.032x+739.63$), 70-74 ($31.559x+847.25$), and 75+ ($y=16.465x+1049.2$). The leading cancer sites in females were: breast (26%), cervix uteri (9%), corpus uteri (8%), cutis (8%), pulmo (5%), ovarium (5%), colon (4%), rectum (4%), ventriculus (3%), and hepar (3%). An increasing tendency of linear trend of incidence was observed for the breast ($y=3.3906x+56.22$), cervix ($y=0.3514x+29.455$), cutis except melanoma ($y=1.8344x+7.1895$), corpus uteri ($y=1.7255x-4.0656$), pulmo ($y=0.9485x+6.6912$), ovarium ($y=0.3521x+14.337$), colon ($y=0.5965x+9.6905$), rectum ($y=0.614x+9.3576$), and ventriculus ($y=0.2165x+9.9488$). Conclusion: Registration of unfavorable incidence trends of malignant diseases among female population in the City of Niš, during 25 years, indicate failure in primary and secondary prevention in the past. It is thus of vital importance to provide much intensive and comprehensive activities for primary and secondary prevention.

Key words: epidemiology, malignant diseases, females, incidence rate, incidence trend

D. Session: EPIDEMIOLOGICAL CHARACTERISTICS AND IMPORTANCE OF MASS CHRONICAL DISEASES

ORAL PRESENTATIONS

1. SHORTCOMINGS IN BLADDER CANCER ETIOLOGY RESEARCH AND A MODEL FOR ITS PREVENTION

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Objectives: Bladder cancer (BC) is the most expensive cancer to treat with incidence and mortality not decreased during last three decades. Numerous uncertainties are still surrounding its etiology. Low-cost BC screening test that would be applicable for early detection in asymptomatic persons, noninvasive and with satisfactory sensitivity and specificity should be priority.

Materials and Methods: Critical issues in BC etiology research we classified as ***entrances***, ***toxicity and metabolism***, ***amounts***, and ***duration of exposure to carcinogens in the bladder.*** Based on the proven risk factors for BC, we presented a simple scoring system as part of a new BC screening method.

Results: 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 and the daily dynamics of exposure to exogenous risk factors. We have calculated a score for BC screening which is an integral component of a new, four-level system of BC prevention.

Conclusion: Interactions of carcinogens and their daily dynamics deserve more attention in further clarifying BC etiology. New attempts in BC screening should be focused on urine content analyses (carcinogens, antioxidants, vitamins, minerals). We propose a score for BC preevaluation and recruitment for screening and a new model of BC prevention.

Key words: *Bladder cancer*, etiology, risk factors, prevention, models.

2. LUNG DISEASES INFECTION AND RISK OF LUNG CANCER

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The **aim** of the study was to determine the existence of the eventual causal associations among the previous lung disease (PLD) and development and distribution of the lung cancer (LC). **Material and Methods:**The research was conducted as a case-control study. A total of 324 microscopically confirmed cases with LC, and the same number of frequency-matched controls (control group-CG) were analyzed using unconditional logistic regression, which provides results in the form of crude odds ratio. The odds ratios and their 95% confidence intervals (CI) were computed. **Results:**PLD was registered in 46% of LC patients. Chronic bronchitis was found in 38.9% of examined subjects and in 18.5% of CG. Chest x-ray findings of tuberculosis were present in 7.1% of patients and in 4.6% of CG. The risk was significantly increased in LC subjects with PLD compared to those who did not have a history of any lung disease (OR=2.83;95%CI 2.01-3.96). There was almost three-fold risk for the development of the LC in patients who have had chronic bronchitis (95%CI,1.96-4.01). **Conclusion:**Each third diseased patient had a history of chronic bronchitis. Due to the established causative relation between cicatrix lung changes and onset of cancer, a strengthened health control of these subjects is imposed as an urgent need.

Key words: lung cancer, previous lung disease, tuberculosis, chronic bronchitis.

3. EPIDEMIOLOGICAL CHARACTERISTICS OF MALIGNANT DISEASES IN THE REPUBLIC OF MACEDONIA

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The aim of this paper is to show an increasing trend of malignant neoplasms in the Republic of Macedonia, as well as review of morbidity and mortality from these diseases. Materials and methods. We used a descriptive method of working on a database for the movement of malignant neoplasms in the Republic of Macedonia obtained from the registers of malignancies, as well as applications for non-infectious diseases of the Public Health Institute - Skopje. The data relating to the period of 2010/2012 years. Results. Malignant neoplasms are the second to the mortality of the population in the Republic of Macedonia to the representation of 18.3% in the overall number of deceased persons. In 2012, in the Republic of Macedonia mortality from malignant neoplasms diagnosed in 3689 persons with a mortality rate of 179.0 per 100,000 population. Noted an increased mortality of 13.9% compared to 2003 when they registered 3238 people died at a rate of 158.8 per 100,000 population. In relation to gender higher mortality rate is recorded in males, and they were represented with 60.6% and women 39.4%. In relation to the localization of the most frequent malignant neoplasm of bronchus and lung cancer with the highest mortality rate of 31.6% ooo in 2003 and an increase of the same to 38.9 deaths per 100,000 population in 2012.

Key words: malignant neoplasms, The Republic of Macedonia.

POSTER PRESENTATIONS

1. MALIGNANT NEOPLASMS IN PROBISTIP 2007-2013

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Objective of the work: To show the situation with the malignant neoplasms in Probistip for the period of 2007-13y. A comparation is made with the situation in R.Macedonia. The morbidity is in scale 1:100000.

Method of the work: Individual applications for non-communicable diseases were used from P.H.O. as also data from I.P.H.-Skopje department of social medicine. An analytically-descriptive method was used.

Results: In the given period in Probistip there are total of 211 registered cases with an average MB-199/100000 which is lower than in R.Macedonia. There more women diagnosed than men 57%-43%. unlike from R.Macedonia where more men got ill. The highest MB found is in the age group over 70y. with MB 4719/100000 as in R.M. Both in R.M. and in Probishtip the most common primary is localized in the breast with average MB(706:737)/100000 while in men in R.M. the bronchus and lung (Mb.76.8/100000) and in Probishtip is the colon (48.5/100000).

Conclusions: Probishtip has lower morbidity than Macedonia, women got ill more often and the most common primary localization in women is the breast, and the colon in men.

Keywords: Malignant, neoplasm, breast, colon, women.

2. ROLE OF GEOGRAPHIC INFORMATION SYSTEM IN CANCER RESEARCH

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Objective: Fighting cancer requires knowledge about the origin, the risk of exposure, and the consequences of variations in the risk of disease among the population. For fight against cancer are needed tools as a geographic information systems that enable the establishment of a relationship between exposure to environmental factors and health at the individual, local, regional and, global level.

Materials and Methods:.Geographic Information Systems (GIS) and other spatial analytical methods allow estimation of the spatial distribution of disease and risk factors. GIS creates a series of "stacked layer" of geo-referenced data (determined by latitude and longitude) that are associated with descriptive information or attributes. GIS has the ability to integrate spatial and temporal data. Application of GIS in cancer research includes the spatial analysis of cancer incidence, mortality, survival, and / or prevalence in the local population. GIS can monitor patterns of cancer and their changes over time and space.

Results: Thethematic maps shows the locationsthat are used forcancerscreeningin the Republic ofSerbia.

Conclusion: GISservesas a means of monitoring, planning and evaluation strategies for cancer control, as well as for prevention and intervention in the community, especially those who are economically disadvantaged.

Keywords:cancer research, cancer screening, geographic information system, mapping

3. BREAST CANCER IN RASINA DISTRICT AND CHALLENGES IN IMPLEMENTING THE NATIONAL SCREENING PROGRAMME

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Introduction: Every year in Rasinski district about 138 women are diagnosed with breast cancer. The National screening program in 2014, it was discovered eight cases of breast cancer.

Objective: Consideration of the epidemiological features of breast cancer, and the ability to reduce the mortality by including women in the screening program.

Materials and Methods: The descriptive epidemiological method. The database CR4 for Rasinski county and databases for the dead.

Results: In the ten year period 2002-2011 breast cancer with 27.6% participated in the morbidity of cancer in women. The average incidence rate of breast cancer, which amounted to 58.9 / 100000 was the first height. The incidence showed a tendency to decrease -2,0321x + y = 73.407; as well as the mortality rate is decreased to a lesser extent -0,4073x + y = 22,34. In 2011 the incidence rate of breast cancer Rasinski district was below the average for Central Serbia.

Conclusion: We expect that during the implementation of the National screening programs for breast cancer, first increase the incidence of breast cancer in general. Is expected to decrease mortality and prolonging survival of newly diagnosed cases of breast cancer.

Key words: breast cancer incidence, mortality and screening.

4. ORGANIZED SCREENING OF CERVICAL CANCER IN THE REPUBLIC OF SERBIA

Milošević B., Naumović T., Jovanović V.

The aim of this study is to present, analyze and evaluate the most important process and outcome indicators from the organized cervical cancer (CC) screening program. The period analyzed in this study was December 2012 (beginning of the CC screening program) until June 2014.

Methods: In the Republic of Serbia, until June 2014, organized cervical cancer screening program was implemented in 15 municipalities-15 Primary Health Centers (PHC), in 10 administrative districts. Monthly reports from regional PHC and Institutes of Public Health were used as a source of data for this analysis.

Results: The number of invited women was 151 148. Coverage by invitations was 61.3%.

Coverage by Pap test was 35.8%. Attendance rate (%) was 58.5%. Positive findings (Pap finding-III, IV and V group) were found in 5639 (6.4%) women.

Conclusion: In the future, more effort should be made to increase the coverage and attendance rate of women through CC screening promotion and education.

Keywords: organized screening, cervical cancer, coverage calls, response, coverage

5. EPIDEMIOLOGICAL CHARACTERISTICS OF COLON CANCER IN BRANICEVO AND DANUBE DISTRICT IN THE PERIOD 2003-2012

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Objectives: The aim is studying the participation of malignant tumors of the colon in total development of malignant diseases, and epidemiological features of the territory in Branicevo and Danubian district. **Materials and Methods**: A descriptive epidemiological method was used. The study included data from the applications of persons suffering from malignant disease and other publications were being processed. **Results:** Due to the unavailability of data for 2012, data for nine year period ending with 2011 were being processed. The total of 1637 patients with average incidence of 45.55 was registered. The lowest incidence was recorded in 2008 in Danubian district 34.24 per 100 000 inhabitants, and the highest in 2007 in the same district 57.79 per 100 000 inhabitants. Although it can be registered in younger age groups, the disease is most common in patients over 50 years. The disease is slightly more frequent in men than women. **Conclusion**: In the world the expansion of malignancy correlates with increasing of population. In Serbia, the population are decreasing, but it is not being registered the decline in the number of patients with cancer. Colon cancer is the second most common malignancy (after lung cancer in men, and after breast cancer in women).

Key words: colon cancer, the incidence rate, Branicevo and Danubian district.

6. EARLY DETECTION OF BREAST CANCER IN SERBIA

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Objective: Comparison of model of the National programme for early detection of breast cancer in the Republic of Serbia with the models of organized breast cancer screening in Croatia, Slovenia, France, UK and Finland.

Materials and methods The data used in this comparative analysis is based ontheRegulation of National programme for early detection of breast cancer in Serbia, data collected through Cancer Screening Office of Public Health Institute of Serbia, andfrom organized breast cancer screening programs of above mentioned countries.

Results: Screening cycle, target population, as well as inviting women to screening is similar in most of the analyzed countries. Mammography is used as a screening test and the interpretation of the findings is done twice, by two independent radiologists in respect to European guidelines for quality assurance in screening.

Conclusion: Given the similarity of organized screening program for breast cancer in Serbia and countries whose programs are compared, reduction of breast cancer mortality in Serbia might beexpected in the next several years.

Key words: breast cancer, incidence, mortality, early detection, organized screening

7. MENTAL HEALTH PROBLEMS IN THE ADULT POPULATION OF NORTHERN KOSOVSKA MITROVICA

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Cilj rada: je da se utvrdi učestalost poremećaja mentalnog zdravlja (PMZ) i njihov uticaj na socijalne odnose (SO) odraslih stanovnika severne Kosovske Mitrovice.

Metod rada: Studijom preseka obuhvaćena je populacija odraslih stanovnika severnog dela K. Mitrovice.Za prikupljanje podataka o socijalno-ekonomskim i demografskim karakteristikama, PMZ i SO korišćen je upitnik koji je korišćen u Ispitivanju zdravlja Republike Srbije u 2006. godini. Statistička analiza uključila je metode deskriptivne statistike i hi-kvadrat test, sa nivoom značajnosti od 0,05.

Rezultati: Istraživanjem je obuhvaćena 161 osoba ženskog i 167 osoba muškog pola. Najučestaliji PMZ bio je osećaj nervoze i zabrinutosti, koga je prijavilo 72,8% ispitanika. Kod 60,7% ispitanih PMZ imali su uticaj na SO. Najveći broj ispitanih (35,1%) se izjasnio za neznatan uticaj, umereno jak i veoma jak uticaj prijavilo je 19,5%, odnosno 5,2% ispitanih, dok je kod 0,9% uticaj PMZ na SO bio izuzetno jak. Uticaj PMZ na SO bio je statistički značajno ($r<0,05$) učestaliji kod osoba starijih od 65 godina (83,3%), udovaca (90,9%), ispitanika nižeg nivoa obrazovanja (83,3%) i osoba koje svoje materijalno i zdravstveno stanje opisuju kao loše (100%).

Zaključak: Problemi sa mentalnim zdravljem predstavljaju učestalu pojavu među odraslim stanovnicima severnog dela K.Mitrovice. Našom studijom utvrđen je i značajan uticaj ovih problema na SO, posebno u populaciji starijih osoba, udovaca, osoba nižeg nivoa obrazovanja i onih koje svoje materijalno i zdravstveno stanje opisuju kao loše.

Ključne reči: mentalno zdravlje, problemi, socijalni odnosi.

8. ANXIETY IN PATIENTS WITH CARDIOVASCULAR DISEASES

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Objectives: Anxiety is a common psychological problem with prevalence between 3.0- 7.3% in the general adult population. The relation between heart diseases and anxiety is bidirectional. The aim of our study was determination of anxiety prevalence in the population of patients suffering from cardiovascular diseases (angina pectoris (AP), infarct myocardial (IM), arrhythmia absolute).

Materials and methods:Cross sectional study was carried out on the sample of 83 patients (40 women and 43 men). A socio-demographics questionnaire and Beck Anxiety Inventory were used.

Results: There were 21.7% examinees with no anxiety symptoms; the rating in the group with mild anxiety was 28.9%, moderate anxiety 15.75%, while even 32.5% of the examinees were in the group with severe anxiety.In the group with the highest level of anxiety the score was in 24.3% of examinees suffering from AP, 28.6% of patients suffering from arrhythmia absolute and 43.8% of patients who got over IM.The scores in the anxiety scale differed in sex in all of the diseases.

Conclusion: Our results show that anxiety has higher prevalence in the population of patients suffering from coronary heart disease. Anxiety is associated with an increased risk of sudden cardiac death. When diagnosed, treated and followed in time, anxiety symptoms, coronary heart diseases and a better understanding of their interrelatedness can certainly bring to a more effective treatment and to amelioration of life quality of these patients.

Key words: anxiety, cardiovascular diseases, Beck Anxiety Inventory

9. FACTORS ASSOCIATED WITH DEPRESSION IN PATIENTS WITH DIABETES MELLITUS TYPE 2

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Background: The aim of the survey was to assess the prevalence ofthe depression in patients with type 2 diabetes mellitus (T2DM), and the identification of risk factors associated with thedepression.

Materials and methods: A cross-sectional survey was carried out among the patients with T2DM at General Hospital in BijeloPolje. Sample of 70 patients participated in the survey. Patient Health Questionnaire 9 (PHQ – 9) is used for the assessment of the presence and theintesity of the depression. The data related to social and demographic characteristic, body – mass index, physical activity, comorbidity, duration of the disease and complications were obtained by questionnaire made for the survey.

Results:Depression was associated withthe duration of the disease more than 5 years (p <0,001),physical inactivity (p <0,005), presence of diabetic polyneuropathy (p <0,014), presence of cataract (p <0,021). Statistically significant variables according to logistic regression analysis were theduration of the disease more than 5 years (OR= 7,27; 95% CI= 2,37 - 22,84), andthe presence of cataract (OR= 4,84; 95% CI= 1,11 - 20,99).

Conclusion: In our survey we found that risk factors for depressive disorders among patients with T2DM are theduration of the disease and the presence of cataract. This suggests that the control of the above-mentioned risk factors, the risk for the occurrence of depression could be decreased.

Keywords: Depression, Diabetes Mellitus type 2, Patient Health Questionnaire 9

10. SOME RISK FACTORS ASSOCIATED WITH CORONARY ARTERIAL DISEASE FOUND IN CASES OF FEMALE PATIENTS DURING MENOPAUSE

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Introduction: Coronary/ischemic heart disease is acute or chronic disease of the heart muscle that occurs due to anatomical or functional changes of the coronary arteries and their branches. The flow of blood is threatened via atherosclerosis walls of arterial blood vessels or narrowing of the lumen that occasionally is caused by vasospasm.

Materials and methods: Case-control study was performed on 200 respondents (female patients older than 45 years in menopause) and on the base of presence/absences of the diagnosis of coronary arterial disease they were divided into 2 groups: patients who have coronary disease and control group.

Results: From 200 respondents, 93 (46.5%) had high blood pressure, 85 (42.5%) were with normal blood pressure, while only 22 (11.0%) had low blood pressure.

Out of 93 respondents with high blood pressure, 68 (73.1%) belong to the experimental group, while 25 (26.9%) belong to the control group. In the group of 85 respondents with normal blood pressure, 25 (29.4%) belong to the experimental group, while 60 (70.6%) belong to the control group/$p<0.05$. From 200 respondents, 61 (30.5%) had elevated levels of blood sugar, while 139 (69.5%) had normal levels of blood sugar. From 61 women that had elevated levels of sugar in the blood, 38 (62.3%) belong to the experimental group (Odds Ratio=2,052) From 200 respondents, 119 (59.5%) had a BMI above normal, 77 (38.5%) normal, 4 (2.0%) below normal. From 119 with a BMI above normal, 68 (57.1%) belong to the experimental group. From 200 respondents, 124 (62.0%) constructively deal with stressful situations, 5 (2.5%) with neutral position, while 71 (35.5%) show destructive behaviour during stressful situations. From 71 that destructively cope with stressful situations, 51 (71.8%) belong to the experimental group, while 20 (28.2%) belong to the control group ($p<0.05$). **Conclusion:**The survey showed that risk factors (blood pressure, glucose, BMI, stress) play an important role in the occurrence of coronary arterial disease, particularly destructive pessimism and stress affects coronary arterial heart disease in women, while those that constructively deal with stressful situation and optimism have protective role in heart health.

Key words: Coronary artery disease, menopause, risk factors

11. CHRONIC DISEASES AMONG ADULT RESIDENTS OF NORTHERN KOSOVSKA MITROVICA

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Objective. To determine the frequency of the most common chronic disease among residents of northern Kosovska Mitrovica and the significance of the differences for the most prevalent diseases in relation to demographic and socio-economic characteristics.

Method. The study was conducted as a cross-sectional study of a representative sample of the adult inhabitants in northern Kosovska Mitrovica in the 2012. As a research instrument was used a questionnaire that was used in a Health Survey in Republic of Serbia in 2006. Were surveyed 328 adult respondents. Statistical analysis included descriptive statistics and chi-square test, with a significance level of 0.05.

Results. The most common chronic diseases among residents of northern Kosovska Mitrovica are hypertension, back pain, rheumatic diseases of joints, increased blood fats and heart insufficiency. As the most common disease, high blood pressure is significantly more frequent in the elderly person (chi-square=60.352; df=2; p=<0.001), widowers (chi-square=53.885; df=3; p=<0.001), who has with many children (chi-square=26.685; df=5; p=<0.001) and with less education (chi-square=24.360; df=4; p=<0.001).

Conclusion. Determination of the most common diseases among the population as well as those groups that suffer from them is very important for the planning and implementation of prevention and health promotion programs.

12. INCIDENCE RATE OF DIABETES MELLITUS IN TOPLICA DISTRICT IN THE 2006-2012 PERIOD

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Diabetes mellitus (DM) is one of the most common chronic disease and a major public health problem. The WHO (World Health Organization - WHO) and the International Diabetes Federation (International Diabetes Federation - IDF) estimates that 2011th, the worldwide suffer from DM 366 million people, and that the number of patients to the 2030th increase to 552 million. The study was designed to examine the basic epidemiological characteristics of DM (in rates) population Toplica District of DM type 1 and type 2 by sex and age, in the period since 2006. to 2010th. Data on all patients and analysis were performed using data from the population register of DM Toplica District. Incidence rates were calculated per 100 000 population.

In the period from 2006 to 2010th in Toplica District, a total of 31 registered people newly diagnosed with type 1 DM (21 men and 10 women) and 1035 of type 2 DM (451 men and 584 women). Average annual non-standardized rate for men with DM type 1 was 17.1, 6.2 for women, while men with DM type 2 was 174.3, and 260.9 for women.The incidence rate was 1.2 times higher among women with type 2 DM In terms of age, patients with type 1 DM, the maximum average incidence rate was registered in the age group 0-4 years (17.20). In type 2 DM, the maximum average incidence rate was registered in the age group 55-59 years (659.6). In general, with increasing age and incidence rates, so that the lowest incidence rates observed in younger children.

Although the highest incidence rates recorded in developed countries, the largest increase in the number of cases expected in developing countries, where one of our country. Therefore, the time to take appropriate preventive measures to prevent the increase in the incidence and mortality of DM

Keywords: diabetes mellitus, incidence, prevention

13. CHRONIC KIDNEY DISEASE – PUBLIC HEALTH PROBLEM IN REPUBLIC OF MACEDONIA

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Main goal: The goal of the study is to determine the distribution and to test the significance of differences between patients with chronic kidney disease who are treated with ambulatory and hospital haemodialysis in Institute of Nephrology – Struga in agreement with the gender, age, place of living (city/village), nationality, marital status, level of education, social status, primary disease, duration of the primary disease, duration of the haemodialysis treatment; To evaluate the patients' satisfaction of the way of communication with the health care personnel, the information about their health condition and further treatment provided by the doctors, as well as retention of the right of equal treatment while providing health care.

Materials and methods: The research was conducted in the Institute of Nephrology – Struga, in the period from 01 November to 01 December 2011. In the study were included and analyzed a total of 80 patients who were on haemodialysis in the institute in the test period, in which the patients were divided in two test groups: (N1) – Patients on chronic haemodialysis program (CHP) which receive ambulatory dialysis 2 to 3 times a week, that mainly live in the Ohrid – Struga region and (N2) – patients on CHP which do dialysis in a hospital, because the lack of space in the Centre for haemodialysis in or near the place of living. Because of that they are obligated on hospitalization in the Institute for Nephrology in Struga.

Results: According to the patients' gender, the occurrence was *almost equal* in men and women ($p = 0,8473$). The examinees, whose haemodialysis was performed ambulant (N1), were approximately $56,8 \pm 11,5$ years old, while the patients who were done a hospital treatment (N2) were $60,3 \pm 15$ years old – the differences were not significant ($p = 0,2386$). According to the nationality, between the examinees from both groups, there is a significant difference ($p = 0,0354$). Bad social status was confirmed by 18 (45%) patients that were treated ambulatory and 17 (42,5%) patients who were treated in a hospital. In both groups, in most of the cases (35% of N1 and 40% of N2), as a primary disease which led to CKD stadium 5 was noted chronic glomerulonephritis. According to the age of the patients during the diagnostic procedure of the primary disease there is no significant difference between the patients of the both groups ($p = 0,0652$). From the total of 80 examinees included in the study, 50 (62,5%) consider that they have an equal treatment as the other patients on haemodialysis in the country.

Concluson: In our country, as well as the rest of the world, patients with CKD treated with haemodialysis are considered as a major public-health problem which should be solved systematically, in advantage of the patients. The country and the health institutions should find a way and resources for improving the conditions for treatment of these patients with which they will enjoy all rights that they deserve according to the Law for protection of patients' rights.

Key words: chronic kidney disease, haemodialysis, patient satisfaction.

14. PRIMARY PREVENTION OF CARDIOVASCULAR DISEASE IN SERBIAN PEDIATRICS - PRAXIS AND PERSPECTIVES

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Primary prevention is the preferred method to lower cardiovascular risk and the resulting social and medical problems. In spite of the fact that numerous pediatric associations recognize the importance of prevention, developing major priorities, strategies and strong recommendations, the real life of public health practice is far from preferred.

Although many significant advances in terms of life savings are potentially affordable we are among the top-notched countries of cardiovascular morbidity and mortality. On the other hand evidence is also accumulating that coronary heart disease begins in childhood and progresses throughout life. Besides, a number of children have unrecognized but treatable primary myocardial or electrical heart disease. Often we neglect myocardial storage disease with much more optimistic prognosis nowadays

The absence of political will or interest, diverse and alienated medical and social care institutions are some of the issues to be addressed in the future.

A lot of initiatives have to be taken by medical workers and representatives to improve our medical system.

15. PREVENTION OF OSTEOPOROSIS IN DIFFERENT AGE GROUPS (ADOLESCENTS, TEENAGERS, ADULTS, MENOPAUSAL WOMEN, POSTMENOPAUSAL WOMEN AND OLD PEOPLE)

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Prevention of osteoporosis is activity of Who in next decade 2011-2020. It is consisting of: early detection of risk patients, healthy nutrition and life style, physical activity and insolation. It is investigating in next age groups: adolescent, tanagers, adults, menopausal women, postmenopausal women and old people, by same parameters but in different range of standard measurements. The aim of our research was in those age groups to assessment of nutrition, life habits, insolation and physical activity. Material and method: The data was collected on population of 1490 in South west region of Macedonia in elementary school, middle school, adults in different work groups and old people associations and home care units. Results: calcium supplementation and healthy nutrition is increasing by increase of age, Tabaco intake is characteristic for age of 22-65 and it is 19%, sport activity is the highest in age 10-21, and it is 29% in age 10-50 years, relative physical activity have 40%, no one indicate by age have fall prevention exercises and phythotherapyintake. DEXA have made 24% from risk groups by age, and only 13% of them intake antireorptive therapy. Discussion: in age 10-14 years physical activity of 4 hours weekly and calcium intake by food is necessary for building good bone mass. The level of recreate gymnastic (walking, dance, palates) and good health life habits are necessary for good bone mass in adults. Prevention of osteoporosis in old people age 65 and more can prevent complications from it, fractures and pain, and bone mass resorption can stop only with medicaments. Conclusion: Our population have good son insolation and must use that for Vit.D, activation, with education and promotion of healthy life style we can increase preventive activities for bone mass bulding and stop bonne resorption.

Key words: prevention of osteoporosis, nutrition, physical activity.

16. THE COURSE AND OUTCOME OF A PREGNANCY WITH HYPERTENSION

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Medical Centre Gadžin Han

Introduction: Gestoses are pathological phenomena that occur with pregnant women as an effect of disharmony between the mother's body and the baby in development. The appearance of edema, proteinuria and hypertension /EPH/ results in eclampsia – the most severe form of gestoses, which can cause death of the pregnant woman and her baby. AIM: The aim of this paper is to present the regular monitoring of pregnant women with hypertension /AP/ in our Medical Care Centre in order to prevent eclampsia as the most severe form of EPHgestoses that threaten the lives of both the mother and the baby. METHOD:In our research we used the medical records of the Department for pregnant women in Medical Care Centre "Gadzin Han"within the period from 2000 to 2012, as well as the discharge records from the Gynecology and Obstetrics Clinic in Nis.RESULTS: The highest number of pregnant women (19) with AP is in the age group from 21 – 30 years old. Regarding the parity, 22 pregnant women were primipara. The values of the blood pressure with 19 of them were mostly 150/100. Three deliveries were with VE, seven with SC, but we didn't have any lethal outcomes. One newly born baby had 1300 gr body weight, while four of them had 2600 gr. CONCLUSION: Medical care for pregnant women along with an adequate treatment and hygienic-dietary regime is an important factor in the prevention of eclampsia. In this way the rate of prenatal mortality, premature births and birth of underweight babies is significantly reduced.

HYGIENE SESSION

SESION: NUTRITION AND HEALTH

INVITED LECTURES

1. DIAGNOSIS AND MONITORING OF PROTEIN-ENERGY MALNUTRITION IN PERITONEAL DIALYSIS PATIENTS

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Protein-energy malnutrition (PEM) is common complication in peritoneal dialysis (PD) patients and contributes to morbidity and mortality. PEM results from a decreased energy or protein intake as compared to actual needs. There are several factors that can contribute to the development of malnutrition that are relatively specific to peritoneal dialysis: losses of protein and amino acids into the peritoneal dialysate; dialysate in the abdomen impart a feeling of fullness that decrease the appetite; hyperglycemia, which can be induced by the absorption of glucose from the dialysate, may suppress appetite.

There is not a single measurement which can be used to determine the presence of PEM. Therefore, malnutrition should be diagnosed by a number of assessment tools including dietary assessment, anthropometry, subjective global assessment and some biochemical examinations that correlate with nutritional status.

In order to prevent malnutrition, periodic assessment of nutritional status should be part of the routine care of dialysis patients to permit early recognition and the institution of appropriate therapy. The nutritional status of the patient should be reassessed every 3–6 months and the dietary regimen should be modified according to changes in patient preferences and clinical status. Early identification of malnutrition and optimal use of diet, the dialysis dose, and perhaps supplements will lead to an improvement in nutritional status and patient outcome.

Key words: malnutrition, chronic kidney disease, peritoneal dialysis.

Protein-energy malnutrition is common complication in PD patients which contributes to morbidity and mortality and affects their survival and quality of life. In PD patients the prevalence of PEM varies, according to the considered nutritional parameters, from 18% to 56%

PEM results from a decreased food intake as compared to actual needs. Multiple factors can affect nutritional status of dialysis patients: restrictive regimens, inadequate dialysis, frequent hospitalization, multiple medications, comorbidities, uncontrolled anaemia, uremic toxins, gastroparesis, exocrine pancreatic insufficiency and reduced mucosal enzyme activities, altered plasma amino acids and neurotransmitters synthesis, inflammatory cytokines, depression, low social status, solitude and an inability to prepare meals.

There are several factors that can contribute to the development of malnutrition that are relatively specific to PD such as losses of protein and amino acids into the peritoneal dialysate, dialysate in the abdomen impart a feeling of fullness that decrease the appetite, early satiety or feelings of fullness, suppression of appetite due to the abdominal distension, suppression of appetite induced by the absorption of glucose from the dialysate, impairment in gastric emptying due to the instillation of dialysate.

There is no single measurement which can be used to determine the presence of malnutrition Thus, malnutrition should be diagnosed by a number of assessment tools including history and physical examination, dietary assessment, anthropometry, subjective global assessment and some biochemical examinations that correlate with nutritional status.

History and physical examination

The history and physical examination can often provide important data which can direct to the patient who might be malnourished. These include symptoms such as nausea, vomiting, anorexia, weight loss or gain, and presence of concomitant problems that can affect nutrition, such as alcoholism, diabetes mellitus, and gastrointestinal disease. Besides, it is necessary to pay attention to some psychosocial issues such as access and affordability of food, and ability to prepare meals. Signs or symptoms of depression should also be identified, since clinical depression often results in decreasing caloric intake.

Dietary assessment

An accurate assessment of the patient's food intake is an important component of the nutritional assessment. 24-hour dietary recall covers short period of time and may not represent a typical food intake. A food diary include longer period of time (include dialysis and nondialysis days). It is very useful, especially if the patient weighs the portions of food.

Anthropometry

Anthropometric measurements provide a rapid, easily performed noninvasive method for evaluating body composition. It is best if serial measurements are carried out by the same observer. If this isn't feasible, it somewhat limits its usefulness. PD patients often have PEM with a reduction of both fat mass and lean body mass. Therefore, assessment of body weight, subcutaneous fat mass and muscle mass are important part of routine nutritional assessment.

Body weight is the simplest and most effective indicator of energy intake and it should be measured regularly. Unplanned weight loss should always be investigated. An unplanned weight loss greater than 10% occurring over 3 months or less has a negative prognostic value. Of course, in a PD patient, edema may be responsible for an increase in body weight. Body mass index (BMI) is also important and easy to determine, although BMI is more useful for the assessment of obesity than of malnutrition.

Body fat is estimated by measuring skin fold thickness at four sites, while mid-arm circumference and mid-arm muscle circumference can provide an estimate of the muscle mass.

Hand-grip strength is a cheap and simple method that agrees reasonably well with other measures of nutritional status and predict outcome in PD patients. Thus it may be recommended for routine follow-up of PD patients.

While anthropometry has the advantage of being simple and quick to carry out, there are less precise than DEXA. There is good correlation between those techniques and that each could be readily used in stable dialysis patients. DEXA is fairly expensive and not always readily available. DEXA should be reserved for selected patients. BIA is not recommended for routine assessment of nutritional status. Thus, at present, anthropometry is the only method that can be readily performed in most units.

Biochemical parameters

Measurement of several circulating proteins has been used to assess nutritional status in PD patients. There are, however, potential limitations to their use in this setting due to changes in protein distribution or metabolism by renal failure or comorbid conditions. Because of that, interpretation of the values obtained should be undertaken with caution.

The plasma albumin concentration correlates well with body protein stores. Since albumin has a long half-life and hepatic synthetic reserve is very large, hypoalbuminemia is a relatively late manifestation of malnutrition. Several studies have demonstrated a negative correlation between the plasma albumin concentration and mortality in PD. The increase in mortality with hypoalbuminemia appears to occur even at near normal albumin levels. CANUSA study has shown that each 10 g/L increase in the plasma albumin concentration decreased the relative risk of death by 6% in PD patients.

However, serum albumin also reflects several non-nutritional factors which are frequently present in PD patients, including infection, inflammation, hydration status, peritoneal and urinary albumin losses, and acidaemia. Thus hypoalbuminaemia in PD patient may not always result from PEM and albumin alone is not a clinically useful measure for PEM. The serum albumin concentration should be measured monthly.

Prealbumin has a shorter half-life than albumin, has a close relationship with nutritional status and is a good predictor of clinical outcome, but it is a negative acute phase protein as well as albumin.

Low transferrin levels have been described in dialysis patients and have been ascribed to malnutrition. However, plasma transferrin values are frequently reduced in renal failure independent of malnutrition, perhaps due to fluctuations in iron stores.

Protein Equivalent of Total Nitrogen Appearance (PNA) is a valid and useful measure of net protein degradation and protein intake in PD patients. There are some limitations to its use. In the clinical stable patients it can be used to estimate protein intake. In the catabolic patient PNA will exceed, while, in anabolic patients PNA will underestimate actual protein intake. When the protein intake is less than 1 g/kg/d PNA may overestimate dietary protein intake. In obese, malnourished, and edematous patients, normalizing PNA to body weight can be misleading.

The serum total cholesterol concentration is reduced in malnourished patients. It is less sensitive nutritional marker, but is cheap and easily available.

Subjective global assessment

Subjective global assessment (SGA) is a useful valid clinical instrument for assessing the nutritional status of PD patients. It is inexpensive and it can be performed rapidly. It gives a global score of protein-energy nutritional status. The SGA is based on history and physical examination. It focuses on gastrointestinal symptoms (anorexia, nausea, vomiting, diarrhoea),

weight loss in the preceding 6 months, and visual assessment of subcutaneous tissue and muscle mass. Scores are subjectively rated on a four-point or seven point scale. The use of the seven point scale is recommended because of its greater sensitivity and its use in large epidemiological studies such as the CANUSA study. SGA has a high predictive value for mortality, but one potential problem with SGA is its subjective natures, which may reduce its reproducibility. The European Best Practices Guidelines also suggest that monitoring include a subjective global assessment.

Monitoring

Nutritional status of the patient should be assessed at the start of PD and reassessed every 3–6 months. Unstable and malnourished patients may require monitoring at shorter intervals. Some parameters such as albumin should be evaluated monthly.

Conclusion:

Malnutrition is higly prevalent among PD patients. In order to prevent malnutrition, periodic assessment of nutritional status should be part of the routine care of dialysis patients to permit early recognition and the institution of appropriate therapy. The routine assessment of nutritional status involves evaluation of dietary intake, anthropometry, laboratory and clinical examinations. The nutritional status of the patient should be reassessed every 3–6 months and the dietary regimen should be modified according to changes in patient preferences and clinical status. Early identification of malnutrition and optimal use of diet, the dialysis dose, and perhaps supplements will lead to an improvement in nutritional status and patient outcome.

References:

Canada-USA (CANUSA) Peritoneal Dialysis Study Group. Adequacy of dialysis and nutrition in continuous peritoneal dialysis: association with clinical outcomes. J Am Soc Nephrol 1996; 7: 198–207.

Carrero JJ, Aguilera A, Stenvinkel P *et al*. Appetite disorders in uremia. *J Ren Nutr* 2008; 18: 107–13.

European best practice guidelines for peritoneal dialysis. 8 Nutrition in peritoneal dialysis. Nephrol Dial Transplant 2005; 20 [Suppl 9]:28-33.

Han SH, Han DS. Nutrition in patients on peritoneal dialysis. Nat Rev Nephrol 2012; 8: 163–75.

Heng AE, Cano NJM. Nutritional problems in adult patients with stage 5 chronic kidney disease on dialyse (both haemodialysis and peritoneal dialysis). Nephrol Dial Transplant Plus 2010; 3:109-17.

K/DOQI, National Kidney Foundation. Clinical practice guidelines for nutrition in chronic renal failure. Am J Kidney Dis. 2000;35:S1-140.

Locatelli F, Fouque D, Heimburger O, Drueke TB, Cannata-Andia JB, Horl WH at al. nutritional status in dialysis patients: a European consensus. Nephrol Dial Transplant 2002; 17: 563-72.

Nazanin N, Kovesdy CP, Murali S, Benner D, Bross R, Block G at al. Dietary assessment of individuals with chronic kidney disease. Semin Dial 2010; 23(4): 359-64

Pasticci F, Fantuzzi AL, Pegoraro M, McCann M, Bedogni G. Nutritional management of stage 5 chronic kidney disease. J Ren Care. 2012; 38(1): 50-8.

Wang AY, Sanderson J, Sea MM *et al*. Important factors other than dialysis adequacy associated with inadequate dietary protein and energy intakes in patients receiving maintenance peritoneal dialysis. *Am J Clin Nutr* 2003; 77: 834–841.

2. EXCESSIVE SALT INTAKE- HUMAN HEALTH RISK

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Noncommunicable diseases (NCDs) are the leading cause of death globally, causing preventable death of more people each year than all other causes combined ([1]). The major NCDs currently account for approximately 60% of all deaths and 43% of disease burden globally. Cardiovascular disease (CVD) itself accounted for 30% of all deaths. Hypertension is considered a major risk for CVD, especially heart attack and stroke ([2]).Excess body weight (body mass index > 25 kg/m^2), excessive consumption of energy, saturated fats, trans fats, sugar and salt, as well as low consumption of vegetables, fruits and whole grains are leading dietary risk factors for NCDs ([3]). Among them, excessive dietary salt intake, greater than 5 g/day, is major risk factor for hypertension, positively correlated with mean blood pressure in a population ([4]) and causes more deaths than any other dietary risk factor ([5]). Also, there is evidence substantiated relation between salt intake and incidence of CVD, especially heart attack and stroke ([6]). High salt intake is recognized as risk factor for end stage of renal failure ([7]), it is in a positive association with stomach cancer ([8]) and osteoporosis ([9]).

Salt intakes across the world's populations vary, in wide range of values, greatly exceeding physiological needs ([10]). Most adult populations have mean sodium intakes between 9 and 12 g/day, although in some population's average salt intake exceeded 20 g/person/day. In most countries over 75-80% of salt consumed comes from processed and ready-to-eat foods. In Japan and China, as opposed to, 75% of salt consumed comes from cooking from high sodium products ([10]).

Population based modest reduction of salt intake is followed by the statistically significant reduction of the mean blood pressure, prevalence of hypertension, morbidity and mortality rate of CVD and all causes of death ([11]). The recognized problem and beneficial outcome of salt intake reduction within population motivated national health authorities worldwide to implement programs on salt intake reduction ([12]). The World Health Organization (WHO) recommends reducing salt intake in the general population as a cost-effective strategy. Measures in this direction are considered a "best-buy" approach to preventing NCDs ([13]).

A prevalence of hypertension in the Republic of Serbia (RS), blood pressure ≥140 mmHg and diastolic blood pressure ≥90 mmHg, among adults aged 18 year and more is 46.5%. In the RS cardiovascular diseases are leading cause of death. They participate with 55.2% in the total death cases ([14]). National salt intake survey in Republic of Serbia (RS) is yet to be done. Results of the pilot survey on salt intake conducted in Novi Sad in 2011-2012, showed that the average salt intake in a sample of adult population of the city of Novi Sad, aged 18-65 years, using the internationally recognized 24 h urinary sodium excretion method was 12,12 g/d. Nearly all of the subjects exceeded the World Health Organization population salt intake goal of 5 g a day, and none of them consumed the amount of salt recommended in non-pharmacological treatment of hypertension ([15]). Another studiesperformed in Novi Sad showed that salt content in meals in public kindergartens, elementary schools, boarding

schools and student restaurants were high ([16, 17]) and that the salt content in ready-to-eat food retailed in Novi Sad have high hidden salt content and that could be considered as an important contributor to relatively high salt consumption of its citizens ([18]).

Results of these studies urges national health authorities to implement National Program on Cardiovascular Diseases Prevention, Treatment and Control in the RS up to 2020 year, which recognized the importance of salt control intake and food products salt labeling ([19]).

In several Member States in the WHO European Region, salt reduction strategiesarethe priority in NCDs prevention programmes. European Food and Nutrition Action Plan (2015–2020) points to the impact of integrated salt reduction programmes. The primary objective is to take a stepwise approach to reducing sodium content across food product categories and market segments, with a view to adaptation of consumer taste preferences over time. Their success depends on monitoring, stakeholder engagement and establishment of benchmarks and targets, with sophisticated population awareness initiatives ([3]).

Keywords: Sodium Chloride, Dietary + adverse effects; Adult; Hypertension

Literature:

1. WHO.Global status report on noncommunicable diseases. Geneva, World Health Organization (WHO), 2010 (http://whqlibdoc.who.int/publications/2011/9789240686458_eng.pdf).
2. WHO. Preventing chronic disease: a vital investment. Geneva, World Health Organization (WHO), 2005 (http://www.who.int/chp/chronic_disease_report/full_report.pdf?ua=1).
3. WHO. European Food and Nutrition Action Plan 2015–2020. Regional Committee for Europe 64th session. Copenhagen, Denmark, 15–18 September 2014. (http://www.euro.who.int/__data/assets/pdf_file/0008/253727/64wd14e_FoodNutAP_140426.pdf?ua=1)
4. Elliot P, Stamler J, Nichols AR, Stamler R, Kesteloot H, Marmot M. Intersalt revisted: further analyses of 24 hour sodium excretion and blood pressure within and across populations. BMJ. 1996; 313:1249-53.
5. Asaria P, Chisholm D, Mathers C, Ezzati M, Beaglehole R. Chronic disease prevention: health effects and financial costs of strategies to reduce salt intake and control tobacco use. Lancet. 2007;370:2044–53.
6. Mackay J, Mensah G. The Atlas of Heart Disease and Stroke. Geneva, World Health Organization (WHO), 2004.
7. Khaledifar A, Gharipour M, Bahonar A, Sarrafzradegan N, Khosravi A. Association between salt intake an albuminuria in normotensive and hypertensive indiciduals. Int J Hypertension. August 2013. Article ID 523682. 4 pages. http://dx.doi.org/10.1158/2013/523682. Hindawi Publishing Corporation.
8. Xiao-Qin W, Terry PD, Yan H. Review of salt consumption and stomach cancer risk: Epidemiological and biological evidence. World J Gastroenterol. 2009;15(18):2204-13.
9. Caudarella R, Vescini F, Rizzoli E, Francucci CM. Salt intake, hypertension and osteoporosis. J Endocrinol Invest. 2009;32Suppl 4: S15-20.

10. Brown IJ, Touzlaki I, Candeias V, Elliott P. Salt intake around the world: implications for public health. Int J Epidemiol. 2009;38(3):791-813.
11. He FJ, Li J, MacGregor G. Effect of long term modest salt reduction on blood pressure. Cochrane systematic review and meta-analysis of randomized trails. BMJ. 2013; 346:f1325.
12. Bibbins-Domingo K, Chertow G, Coxon P, Moran A, Lightwood JM, Pletcher MJ, Goldman L. Projected effect of dietary salt reduction on future cardiovascular disease. NEJM. 2010;362:590-9.
13. WHO. Mapping salt reduction initiatives in the WHO European Region. WHO Regional Office for Europe. Copenhagen, Denmark, 2012.(http://www.euro.who.int/__data/assets/pdf_file/0009/186462/Mapping-salt-reduction-initiatives-in-the-WHO-European-Region.pdf)
14. Ministry of Health of Republic Serbia. National Health Survey: Serbia, 2006. Belgrade, Serbia: Ministry of Health of Republic of Serbia; 2007.
15. Popovic M. Salt intake in a sample of adult population in Novi Sad [dissertation]. University of Novi Sad, School of Medicine, Novi Sad, Serbia 2013.
16. TrajkovićPavlovićLj, MartinovCvejin M, Novaković B, Bijelović S, TorovićLj: Analysis of salt content in meals in kindergarten facilities in Novi Sad. Srpskiarhivzacelokupnolekarstvo. 2010;138(9-10):619-23.
17. Trajkovic-PavlovicLj, Popovic M, Velicki R, TorovicLj, Bijelovic S. Salt content control in public mass catering meals dedicated to children, adolescents and students in the city of Novi Sad. 20th International Congress of Nutrition, Granada, 2013, September 15-20, Ann NutrMetab 2013;63(suppl 1):902.
18. Trajkovic Pavlovic Lj, Popovic M, Torovic Lj, Velicki R, Bijelovic S. Salt content in retailed food in Novi Sad. Proceedings of 6th Central European Congress on Food, Novi Sad, Serbia, May 23-26, 2012. Central European Congress on Food 6; 2012;Novi Sad: 257. ISBN 978-86-7994-027-8.
19. The Regulation on the National Program on Cardiovascular Diseases Prevention, Treatment and Control up to 2020 (Serbian language), Official gazettes of the Republic of Serbia No 11/2010.

3. ARE THE FATTY ACIDS A NEW RISK FACTOR FOR CARDIOMETABOLIC SYNDROME?

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Fatty acid as food ingredients through different physiological mechanisms regulating cholesterol metabolism and lipoprotein concentrations in the blood and affect the other cardiometabolic risk factors such as blood pressure, hemostasis, glycoregulation and body weight. Dietary habits in our population were energy-dense diet, high in saturated fat and sugar with imbalance intake of polyunsaturated fats which may be important in pathogenesis of many lifestyle-related diseases.Furthermore, a large intake of fat in the diet, but also inadequate profile of the fatty acids in serum and erythrocytes can affect the progression of obesity and insulin resistance.These findings suggest the usefulness of measurements fatty acid status in supplementation-intervention and nutrition-epidemiological studies in relationship between diet intake/status and disease/health outcome. Fatty acid status in patients with different clinical metabolic condition, but also in our healthy population, indicate the necessity of nutrition care program and the use appropriate diet with adequate saturated/monounsaturated/ω-6/ω-3 ratio. Date acquired knowledge on the effects of the metabolism of the individual fatty acids, as well as their interactions with other nutrients, gene expression, and the biomarkers of their status in the main risk factors for occurrence cardiometabolicsyndrome, particularly in obesity, dyslipidemia, insulin resistance and diabetes, show the importance of the fatty acids intake in the prevention and treatment of cardiometabolic syndrome.

Key words: biomarker, diet, cardiometabolic syndrome, supplementation, fatty acids

Introduction

The concept of cardiometabolic risk factors is a cluster of conventional cardiovascular risk factors and metabolic syndrome factors including central obesity, hypertension, insulin resistance, dyslipidemia, and inflammatory responses. In recent years, there has been increased focus on the role of diet, especially dietary fats acids in the etiology and development of cardimetabolic syndrome [1,2]. The metabolic effects of individual dietary fats may also be modified by the overall fatty acid composition of the diet. Dietary fat is a mixture of fatty acids (FA), with saturated (SFA), trans-unsaturated (TFA), monounsaturated (MUFA) and polyunsaturated (PUFA) as the main components. It have been recently reported that saturated fat intake greater than 10% of total caloric value represented a double risk for cardiometabolic syndrome diagnosis [2,3]. This association is mostly attributed to saturated palmitic acid due to the fact that excessive intake of palmitic acid increases the visceral adipose tissue in greater proportion than other fat types. Although, dietary recommendations have focused on restricting SFA consumption to reduce cardiovascular disease (CVD) risk,

evidence from prospective studies has not supported a strong link between total SFA fats intake and CVD events [3]. In the large multiethnic cohort, a higher intake of dairy SFA, which was the greatest contributor to total SFA consumption, was inversely associated with lower CVD risk [4]. Also, there was observed no significant associations of plant or butter SFA intake with CVD risk. In contrast, a higher intake of meat SFA was associated with higher CVD risk. Primary prevention studies have clearly demonstrated benefits of high-dose long chain ω-3 PUFA supplements on metabolic risk factors. It was recently reviewed that reductions in the ω-6 to ω-3 PUFA ratio in the diet may lower the incidence of many chronic diseases that involve inflammatory processes [2,5,6]. Thus, the specific ω-6/ω-3 PUFA ratio in the diet is of particular interest for maintaining overall health and current dietary guidelines generally put more emphasis on the quality of fat.

Dietary sources

One of the most abundant SFA in many common foods (dairy, meat, palm and coconut oil) is palmitic acid. The amount of palmitic acid is the highest in palm oil (around 50%), but significant amounts of palmitic acid (25-26%) can also be found in butter, chicken fat, lard, beef and lamb fat, as well as in cocoa butter [1,3]. Even olive oil, which is one of basic components of the healthy Mediterranean diet, contains around 16% of palmitic acid [1,2]. Furthermore, palmitic acid is present in human milk with 20-25% of total fats. Overall, palmitic acid and stearic acid (18:0) are the most common dietary SFA and therefore they are also the major SFA in human plasma and tissues. Their concentration in serum/plasma phospholipids and cholesterol esters reflect dietary high fat intake. Commonly present MUFAs in the diet is oleic acid, which is found mostly in olive (56-84%) and rapeseed oil [1]. Linolenic acid (LA, precursor of ω-6) is present in significant amounts in many vegetable oils, including corn, sunflower, grape seed and soybean oils, and in products made from these oils, such as margarines. Alfa-linolenic acid (ALA, precursor of ω-3) is found in green plant tissues, in some common vegetable oils, including soybean and rapeseed oils, in some nuts and in particular in linseeds and linseed oil. Arachidonic acid (20:4, ω-6) is mostly present in meats and its intake is estimated at 50 to 500mg/day [1]. The richest sources of eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), are oily fish (tuna, salmon, mackerel, herring, and sardine). One oily fish meal can provide between 1.5 and 3.5g EPA+DHA. Consumption of 1g fish oil capsule per day can provide about 300mg of these fatty acids. According to habitual dietary information in Serbia, on small sample size, low fat consumers have an intake of 10.4, 11.2, and 5.4% of daily energy intake (% E) and high fat consumers around 13.4, 14.5 and 5.9 % E from SFA, MUFA and PUFA, respectively [7]

Dietary fatty acids and lipids

In general, SFA and TFA increase while MUFA and ω-6 PUFA decrease low-density lipoprotein (LDL) cholesterol [8,9]. Dietary ω-3 PUFA are more potent in reducing triglycerides, partly through improved lipoprotein lipase activity [1,2,8], but have a limited effect on LDL and high-density lipoprotein (HDL-C) cholesterol concentrations. However, supplementation with PUFA among individuals with relatively high TFA intake may have limited benefits on lipid profiles [9]. According to several publications, substituting SFA with unsaturated fats convincingly decreased concentrations of serum/plasma total and LDL-cholesterol in randomized control studies (RCTs) [2,9]. For these reasons, recommendation by the WHO/FAO experts for SFA (butter, cream, full-fat dairy products) intake is limited to less than 10% of daily energy needs [10]. Thus consumption of PUFA or MUFA in place of SFA leads to lowering of serum/plasma total cholesterol, LDL-cholesterol, and ApoB, slight lowering (for PUFA) of HDL-cholesterol and ApoA1, little effect on triglycerides and lowering of the total cholesterol/ HDL-cholesterol. Meta-analysis of 72 randomized control

trials reported a serum triglyceride reduction of 25–30 % at a dosage of 3–4g/day of EPA+DHA [1,2]. The most abundant SFA in milk fat is palmitic acid, which make up about 36% of total fats and 44-51% of the total SFA in milk fat [3,4]. For this reason, milk and dairy products are usually considered unhealthy, especially for people with dyslipidemia. In spite of this fact, it has been well established that milk fat raises serum HDL-cholesterol, helping to maintain a good HDL-cholesterol/total cholesterol ratio that is inversely related to CVD [3,4]. Furthermore, palmitic and stearic acids in milk fat occupy the sn-2 position of triglycerides, which is typically the position of unsaturated fatty acids in plant oils [3].

Cardioprotective effects of dietary fats

The cardioprotective effects of ω-3 PUFA, especially ALA, EPA, and DHA, have been defined by epidemiological, human, animal, and cell culture studies [1,2,5]. Some studies attribute the cardioprotective properties of ω-6 PUFA to LDL-cholesterol lowering properties while others contradict these conclusions mostly due to the potent pro-inflammatory effects of specific eicosanoids derived from AA [2,6]. Hence there is no clear evidence that ω-6 fatty acids elevate markers of inflammation. LA has been shown to enhance the clearance and down regulate the production of LDL-cholesterol and to have a protective role on the cholesterolemic effects of SFA at intakes 5% E. In recent years there has been growing interest in the potential for plant-derived ω-3 PUFAs to mimic the effects of long chain ω-3 in mediating CVD risk. Beneficial effects of ALA on thrombosis and arterial compliance have been shown at intakes between 2 to 5 E% but this is greatly in excess of estimated habitual intakes (approximately 0.6% E) [1,2,5]. High intakes (2.3% E) have also been shown to have negative effects on CVD risk: reducing HDL-cholesterol and raising the LDL /HDL-cholesterol ratio. Decreasing dietary ω-6/ω-3 PUFA ratio to approximately 3:1 in older individuals by increasing the intake of EPA and DHA, lowers fasting and postprandial plasma triglycerides concentrations, but also decreased the proportion of small dense LDL while the proportion of HDL2 increased. Overall, these findings indicate that in the context of a total PUFA intake of 6% E, decreasing the ratio by increasing the intake of EPA and DHA to approximately 1–1.5g/day resulted in potentially beneficial effects with regard to cardiovascular risk [2,5].

In the National Heart, Lung and Blood Institute Family Heart Study high intakes of ALA or LA were both associated with low risk of CVD in a cross-sectional study. The Health Professionals Follow-up Study also showed that intakes of LA were inversely associated with CHD risk in men and the Nurses' Health Study showed the same association in women [1,2,6]. In addition, a systematic review of primary and secondary prevention trials where SFA were replaced by PUFA showed a reduction in coronary events with a non-significant trend for a reduction in all-cause mortality [3]. An increasing body of evidence suggests that n–3 PUFA supplementation may improve defects in insulin signaling and prevent alterations in glucose homeostasis and further development of diabetes type 2 [5]. These effects are possibly mediated through the PPARs, which are up-regulated by long-chain PUFA and in turn are related to the gene expression involved in lipid oxidation and synthesis. Other pleiotropic effects of ω–3 PUFAs may contribute to decreased condition of the metabolic syndrome, such as modulation of inflammation, platelet activation, endothelial function and blood pressure. A meta-analysis of 60 controlled trials reported that replacement of carbohydrates with PUFAs (largely ω-6) had a beneficial effect on the total cholesterol/HDL-cholesterol ratio, and on the LDL-cholesterol concentration [1,2]. Replacing SFA by ω-6 PUFA also led to a substantial reduction in the total cholesterol and LDL-cholesterol, a reduction of the total cholesterol/HDL-cholesterol ratio and thus may reduce the risk of coronary heart disease (CHD) [8,10]. Meta-analysis found a dose-response hypotensive effect of 5.6g ω-3 PUFAs on, systolic and diastolic blood pressure, which was reduced by 3.4 and

2.0 mmHg respectively in hypertensive patients [1,2,5]. Dietary fats may modulate blood pressure through different mechanisms. Possible mechanisms include modulation of the biosynthesis of eicosanoids: hydroxyl eicosatetraenoates or epoxy eicosatrienoates [2,5]. PUFA ω-6 and ω-3 are converted to prostaglandins, which reduce blood pressure by affecting arterial vasodilation, electrolyte balance, and renal release of renin or pressure hormones.

Dietary fatty acid intake and status as cardiometabolic risk factor

Central to the etiology of cardiometabolic syndrome is an interrelated triad comprising inflammation, obesity (particularly abdominal), and aberrations in fatty acid metabolism [1,2,5]. Dietary SFA are of particular scientific interest because of their association with CVD. However, meta-analyses of cohort studies with self-reported SFA intakes are not associated with CHD, stroke, or CVD [3,4]. Although, high fat intake and serum fatty acid profile may influence the progression of obesity and insulin sensitivity [1,2,11]. Insulin resistance is markedly affected by the amount and composition of dietary fats [2,12]. Amount is particularly important, since excessive intake of total fat (> 37% of daily energy intake) independently on the fatty acid composition in diet, may worse insulin resistance [2]. Although underlining mechanism is still unclear, it likely includes interference with binding of insulin to its receptors and accumulation of triglycerides in skeletal muscle [5]. For instance, Δ9 desaturase-1 (palmitooleic/palmitic acid) is valuable marker of dietary saturated fat intake [3], but has also been established as an independent predictor of directly measured insulin sensitivity [5]. Further, high SFA proportion in serum phospholipids can predict the development of cardiometabolic syndrome [12].

The proportion of fatty acids in serum and erythrocyte phospholipids, an important determinant of both health and disease, depends on the dietary intake and endogenous metabolism controlled by genetic polymorphisms. Thirteen studies have been reviewed and it was found that serum EPA and DHA was significantly lower in the cases of CHD than in the controls as predicted [1,2]. Thus increasing the intake EPA and DHA by 1.2 or 3g/day lowered the erythrocyte content of ω-6 highly unsaturated fatty acids by 26, 39 and 48%, respectively [2,5]. It follows that increasing the intake of ω-3 (competition with ω-6) is a more effective way of lowering tissue AA content than decreasing the intake of ω-6 fatty acids. Fatty acid composition in serum lipids reflects dietary fat intake for 6 to 8 weeks and metabolic processes [12]. High proportions of palmitic, palmitoleic (16:1), and dihomo-γ-linoleic (20:3,ω-6) acids and a low proportion of LAin serum/plasma lipids predicts cardiometabolic syndrome, type 2 diabetes, myocardial infarction and stroke [12,13].

Patients with hyperlipidemia in our population have low levels of ω-6 and ω-3 PUFA and higher levels of SFA in serum and erythrocyte phospholipids compared to healthy subjects (Table 1) [14].

Table 1. *Fatty acid status in Serbian population with cardiometabolic risk* [2,4,11,14,15]

Fatty acid	Cardiometabolic risk patients			Healthy subjects
	Hyperlipidemic patients (serum) (Er)	**Obesity women** **NGT group IR group** (Er)	**Diabetic patients** (serum)	(serum) (Er)
Palmitic acid	30.3±5.9 25.6±4.2	22.5±1.7 22.7±1.2	30.0±2.7	26.5±2.4 22.4±2.6
SFA	48.6±9.4 44.7±1.1	40.7±1.7 41.8±2.9	47.17±1.5	42.6±3.1 41.1±4.8
MUFA	12.1±1.9 18.2±2.3	16.6±0.8 17.4±1.5	11.1±2.3	12.2±1.7 17.5±2.7
PUFA	42.0±1.7 41.1±2.4	42.7±1.9 40.7±3.6	43.0±3.8	45.4±2.9 43.3±2.4
n-6	37.6±10.1 31.1±7.1	35.0±2.4 35.0±3.4	39.5±3.4	40.8±2.9 36.6±2.4
n-3	3.4±1.1 5.4±2.2	7.6±1.7 5.7±1.2	3.5±1.0	4.6±1.4 6.9±1.3
n-6/n-3	11.7±4.6 5.8±2.1	4.8±1.4 6.4±1.37	11.2±2.8	8.8±1.6 5.5±1.1

In the Serbian population with type 2 diabetes who also had abnormal lipid levels, the ω-6 and ω-3 PUFA in plasma were lower, while the ω-6/ω-3 ratio was higher when compared to healthy subjects [15]. EPA, DHA and total ω-3 PUFAs in the erythrocyte phospholipids in these patients were also low. ω-6/ω-3 ratio was 11.7, 11.2, 8.8 in type 2 diabetic patients, hyperlipidemic patients and healthy subject, respectively. Suboptimal levels of ω-3 PUFA in erythrocytes have been found in obese subjects, as well as a lower proportion of EPA, DHA and total ω-3 PUFA, and a significantly higher ω-6/ω-3 ratio in insulin-resistant (IR) [11]. Palmitic acid and total SFA are higher with now significant difference in MUFA proportion in serum phospholipids in patients with diabetes type 2 and hyperlipidemic patients compared to healthy subject. Obesity patients with normal glucose tolerance (NGT) have higher levels of MUFA in erythrocyte (Er) compared to IR obesity patients [11]. Serum phospholipids fatty acid profile is suitable biomarker of dietary fatty acid intake. Nevertheless, the fatty acid composition in serum lipids can be used not only as a biomarker of fat quality intake, but also as an indicator of disease risk. In spite of pathologies, diet could markedly change the fatty

acid profiles in patients; however, the ω-6/ω-3 ratio in healthy subjects in the Serbian population was also very high above 11 to 12 suggesting the importance of changing dietary habits in Serbia.

Conclusion

Associations of SFA with health may depend on food specific fatty acids or other nutrient constituents in foods that contain SFA, in addition to SFA. Date acquired knowledge on the effects of the metabolism of the individual fatty acids, as well as their interactions with other nutrients, gene expression, and the biomarkers of their status in the main risk factors for occurrence cardiometabolic syndrome, particularly in obesity, dyslipidemia, insulin resistance and diabetes, show the importance of the fatty acids intake in the prevention and treatment of cardiometabolic syndrome. Fatty acid status in patients with different clinical metabolic condition related to cardiovascular risk and may be a useful functional marker and disease indicator; indicate the necessity of nutrition care program and the use appropriate diet with adequate saturated/monounsaturated/ω-6/ω-3 dietary fatty acid ratio.

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References

1. Ristic-Medic D, Vucic V, Takic M et al. Polyunsaturated fatty acid in health and disease. J Serb Chem Soc. 2013, 78:1269-1289.
2. Ristic-Medic D, Vucic V. Dietary Fats And Metabolic Syndrome. J Nutrition Health Food Sci. 2013,1 (1):8
3. de Oliveira Otto MC, Jacobs DR, Mozaffarian, D, et al..Dietary intakes of saturated fat by food source and incident cardiovascular disease: results from the Multi-Ethnic Study of Atherosclerosis. Am J Clin Nutr. 2012, 96:397-404.
4. Ristić-Medić D and Vučić V. Charper 9. Palmitic acid as a cardiometabolic risk factor. In Palmitic acid: Occurence, Biochemistry and Health effects, Lukas F. Porto (Editor). Nova Science Publishers Inc. 2014, pp 105-124.
5. Poudyal H, Panchal SK, Diwan V, Brown L. Omega-3 fatty acids and metabolic syndrome: effects and emerging mechanisms of action. Prog Lipid Res. 2011,50(4):372-87.
6. Vanhala M, Saltevo J, Soininen P et al. Serum omega-6 polyunsaturated fatty acids and the metabolic syndrome: a longitudinal population-based cohort study. J Epidemiol. 2012, 176(3):253-60.
7. Nikolic M, Ristic Medic D, Stanic D, Postic M, Arsic A, Niketic V. Dietary lipid intake influences the level of cholesterol bound to haemoglobin in human erythrocytes. Eur J Nutr, 2008, 47: 123–130.
8. Hunter JE, Zhang J, Kris-Etherton PM. Cardiovascular disease risk of dietary stearic acid compared with trans, other saturated, and unsaturated fatty acids: a systematic review. Am J Clin Nutr 2010, 91: 46-63,
9. Brouwer IA, Wanders AJ, Katan MB. Trans fatty acids and cardiovascular health: research completed? Eur J Clin Nutr. 2013, 67(5):541-547
10. Elmadfa I, Kornsteiner M. Fatty acids and fatty acid requirements for adults. Ann Nutr Metab. 2009, 55: 56-75
11. Takic M, Ristic-Medic D, Mandic Lj, et al.: N-3 polyunsaturated acids in erythrocyte phospholipids are associated with insulin sensitivity in obese patients on a typical Serbian diet. Arch Biol Sci Belgrade. 2009, 61(1): 37-43.

12. Kim OY, Lim HH, Lee MJ, Kim JY, Lee JH Association of fatty acid composition in serum phospholipids with metabolic syndrome and arterial stiffness. Nutrition, Metabolism & Cardiovascular Diseases 2013, 23(4): 366-374.
13. Warensjö E, Sundström J, Lind L, Vessby B. Factor analysis of fatty acids in serum lipids as a measure of dietary fat quality in relation to the metabolic syndrome in men. Am J Clin Nutr 2006,84: 442–448.
14. Ristic-Medic D, Suzic S, Vucic V, Takic M, Tepsic J, Glibetic M. Serum and erythrocyte membrane phospholipid fatty acid composition in hiperlipidemia: effects of dietary intervention and combined diet and fibrate therapy. Gen Physiol Biophys, 2009, 28: 190-199.
15. Ristic Medic D, Ristic V, Arsic A, et al. Effects of soybean D-LeciVita product on serum lipids and fatty acid composition in type 2 diabetic patients with hyperlipidemia. Nutr Metab Cardiovasc Dis. 2006, 16(6): 395-404.

ORAL PRESENTATION

1. THE INFLUENCE OF QUALITY EDUCATION IN FOOD SAFETY

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Introduction: In order to ensure the food safety, it is necessary to deal with all aspects of practices which may have an impact on food safety in the entire food chain. Education in food safety is carried out for that purpose.

Objective: To present the results on the impact of education in food safety in food companies

Method: Survey and questionnaire has been carried out in one hundred of food production companies which have passed the education in food safety. Proportional system of sample units was chosen as follows: 8 companies for food production, 24 shops, 57 companies of public nutrition, 5 distribution companies, and 6 butcheries.

Results: The results of the individual items of food safety show that relevant sanitary technical equipment was improved (+ 19.5%), the HACCP system is better (46,52%) increases the level of hygiene and health status is monitored better (+ 61,65).

The level of good hygiene practices of employees in dealing with food and control of pests and hygiene of plant is increased (34.2%). An increasing number of operators decide for laboratory analysis and control of conformity of foodstuffs (+ 9.11%),.

Conclusion: The results of the analysis show that education and training in food safety has a major impact on organizations that have contact with food.

Key words: food safety, good hygienic practice, education, HACCP system

POSTER PRESENTATION

1. *IN VITRO* ANTIBACTERIAL ACTIVITY OF METHANOLIC EXTRACTS FROM *SALVIA VERBENACA* L.

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Objectives: Plant species of the family Lamiaceae are the sources of natural preservatives and antioxidants which have been long used as the constituents of foodstuffs and medical products. *Salvia verbenaca* L. is an aromatic plant traditionally used as a flavouring and spice. The objective of the study was to determine antibacterial activity of methanolic extracts of the above-ground parts of *S. verbenaca* collected in Niš.

Material and methods: Herbal material was extracted with absolute and 80% methanol by both maceration and ultrasonic method, respectively. Determination of minimum inhibitory and bactericidal concentration (MIC and MBC) was carried out by micro-well dilution method against laboratory control strains obtained from the American Type Culture Collection: *Bacillus cereus, Listeria monocytogenes, Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa* and *Salmonella enteritidis*.

Results: All extracts exerted inhibitory effects on every tested bacterium in the range MIC=12-100 mg/mL. It is particularly important to emphasize the high inhibitory activity against *P. aeruginosa,* which is a nosocomial, opportunistic pathogen and the most usual cause of food spoiling in refrigerators. The extract prepared with 80% methanol by ultrasonic method gave best results for this strain (MIC/MBC=12/12 mg/mL).

Conclusion: Further research should be conducted to confirm non-toxicity and safety of the extracts.

Key words: *Salvia verbenaca*, methanolic extracts, antibacterial activity

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2. MICROBIOLOGICAL CRITERIA AND FOOD SAFETY IN THE REPUBLIC OF SERBIA- THE CURRENT SITUATION

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The Ministry of Agriculture of the Republic of Serbia adopted the Law on Food Safety in 2009, the Rulebook on "Microbiological Criteria" in 2010 and a Guide to the Application of Microbiological Criteria containing additional recommended process hygiene criteria in June 2011.

After several years of implementation of these regulations, the following questions have arisen: What results have been achieved? Are there any professional dilemmas? and, in particular, Has the application of new microbiological criteria contributed to achieving the main goal of the Law on Food Safety – ensuring a high level of human health protection?

The main issues regarding the application of microbiological criteria are as follows:

1. a complete lack of microbiological criteria for particular food categories
2. incomplete microbiological criteria for particular food categories
3. inappropriate limits set for certain microbiological criteria
4. inadequate methods for certain microbiological criteria
5. an undefined number of units constituting a sample for small FBOs

This has resulted in a complete lack of harmonised microbiological process hygiene criteria for major food categories. The situation has received different interpretations by FBOs, authorities and analysts, starting from an explanation that the lack of defined criteria suggests that no testing is required through to testing different criteria, with different limits for the same categories of food established, resulting in the absence of any traceability and food-related microbiological risk management.

With the current problem of undefined state-level authority over food control within the distribution system, it is clear that food safety (in terms of the presence of serious microbiological risks that are not under either FBO or state control) is highly threatened.

The process hygiene criteria recommended in the Ministry of Agriculture Guide need to be revised as soon as possible in order to correct the above mentioned deficiencies and improve microbiological control of food products and, hence, reduce the risk of epidemics and ensure the maintenance and promotion of public health.

Key words: Microbiological Criteria, food, Food law

3. QUALITY CONTROL OF MICROBIOLOGICAL TESTS OF FOOD AND WATER BY INTER LABORATORY COMPARISONS (PROFICIENCY TESTING SCHEMES)

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Introduction: The laboratory for sanitary microbiology is included in the rank of accredited laboratories according to ISO/IEC 17025 Standard.

Besides the application of the ISO Methods in the everyday routine testing, in accordance to the requirements of ISO 17025 Standard, each laboratory must provide internal and external control of the testing quality.

Aim: One of the essential elements for conducting of external control of the quality of the results from the microbiological testing of food and water is the participation in Proficiency testing schemes (PT) that are organized by reference laboratories FEPAS (Food Examination Performance Assessment scheme) and LEAP (Laboratory Environmental Analysis Proficiency scheme).

Material and methods: Identification and enumeration of the defined parameters is done in the dehydrated samples of food (beef and chicken, flour, powder milk, soft cheese) and water samples.

Results: When analyzing the data, the results received with participation in the inter laboratory comparison testing's, statistical methods are applied, including evaluation of the results according to the Z-value (a simplified method of Mandel h statistics). Z-value is calculated according to the following formula:

$Z = (x-X)/\delta$, where: x – result of individual laboratories, X – determined, received value in a reference laboratory δ – standard deviation.

Regardless of the number of laboratories, participants and the number of repeated tests, Z-values have the following interpretation: $z <= 2$ – satisfactory results, $2 <= z <= 3$ - doubtful, questionable results, $3 <= z$ – unsatisfactory results.

The goal of each lab is to get acceptable results of the tests, i.e. $z <= 2$, indicating the reliability of the results.In our laboratory are obtained results that are in the permitted range $z <= 2$:

coagulase positive staphylococci z –score 0,8; yeasts and molds -0,5; *Enterobacteriaceae* - 0,3;*E.coli* -0,5.(tests of food); Except in quantitative,we have participated in qualitative PT - scheme for detection *Salmonella spp.* and *Listeria monocytogenes*, where the results are based on the presence and absence of the requested bakteria.And these tests are assessed as satisfactory results..In the samples of water were obtained the following results: for *Escherichia coli* z-score 0.5, *Enterococcus*-0,3i *Pseudomonas aeruginosa* -0,3.

Conclusion: Based on the results from the interlaboratory tests (FEPAS and LEAP) derives that with the applied methods for testing water and food in our laboratory are obtained reliable results . This enables continuous improvement and development of new methods, and also checking the quality of work internationally.

Key words: Proficiency testing shemes, LEAP,FEPAS

SESION: ENVIROMENT AND HEALTH

INVITED LECTURES

1. CONTAMINATION OF INDOOR AIR RELATED TO FUNGI AND MOULD

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Interest in indoor air quality first emerged in USA in the 1970, when "Sick Building Syndrome" was first described. Biological pollutants may originate from human activity, building materials and carpets; they may also penetrate from outdoor environments. One of the common indoor air pollutants are fungi and mould. Their presence in indoor air is result of transportation from outside environment via building materials, carpets, furniture, wallpapers, etc. Ventilation and air-conditioning systems are another common ways of penetrating of fungi into the buildings. The rate of further growth, spreading and multiplication depends exclusively on moisture content in indoor air, regardless the type of surface. The natural food source for fungi vary from plant, animal and human particles in house dust, to fragments of construction materials such as floor and wall textile coverings, furniture, residua of cooking traces, food storage, paper materials. Fungi may be extremely harmful for human health, but may also destruct the building itself, particularly the wooden parts, such as roofs, timbers, and other materials. Some fungi species produce strong allergens, which initiate immune reaction type I (IgE mediated). For example, the indoor contamination with *Alternaria, Penicillium, Aspergillus* and *Cladosporium* spp., is related to asthma and other allergic respiratory diseases. Some of these species, such as *Penicillium* and *Aspergillus* can also induce type III allergy (IgG mediated), while at high concentrations, may also initiate combined type III and IV reaction manifested as hypersensitivity pneumonitis. Major fungal allergens are isolated and identified (such as Cla h I from *Cladosporum herbarum*, Alt a I and Alt a II from *Alternaria alternata* and Asp f I and Asp f III from *Aspergillus fumigatus*). The harmful effect of mycotoxins is manifested by interference with RNA synthesis leading to DNA damage. Fungi mycotoxins have strong genotoxic, cancerogenic, and immunotoxic potential. The cancerogenic effects of aflatoxin (mycotoxin produced by *Aspergillus flavus* and *Aspergillus parasiticus*) are well known. The most important mycotoxins related to indoor air contamination are trichotechens, generated by fungi *Stachybotrys chartarum* (macrocyclic trichotechens, trichodermin, sterigmatocystin and satratoxin G). Several fungi also produce volatile organic compounds as the result of their metabolic processes, but their effects on human health are yet to be investigated. Considering the difficulties in assessment of biological pollutants in indoor air, this problem is more pronounced.

Key words: air pollutants, mycotoxins, fungi, mould, environments

Interest in indoor air quality emerged in USA in the 1970, when „Sick Building Syndrome" was first described (1). During those years, due to energy crisis, the building environments substantially changed – namely, the ventilation, air-conditioning, and other energy-demanding

maintenance processes were sparingly used, particularly in public office buildings. Many office workers reported headache, mucous membrane irritation, and difficulty concentrating during working hours. All symptoms disappeared at home. Understanding of risk factors underlying this epidemic led to improvement of legislation regarding ventilation rates and maintenance, so the number of complaints decreased in the 1990s.

Indoor air pollution is present in virtually each and every indoor space. Biological pollutants may originate from human activity, building materials and carpets; they may also penetrate from outdoor environments by forced ventilation, diffusion or infiltration. The influence of the pollution on human health may vary, depends on age, health condition, and individual predisposition.

Historically, moulds were the very first recognized and recorded contaminants in indoor environment. World Health Organization (WHO) Regional Office for Europe, in 2006 prepared Guidelines for indoor air quality (2), according to previously formulated postulate *The right to healthy indoor air*. The importance of this problem is emphasized by the fact that people, particularly vulnerable populations such as children, pregnant women, elderly, ill and disabled, spend a substantial amount of time indoors.

According to conclusions of WHO working group (2), there are no specific microorganisms that can be specifically associated with indoor air pollution; rather they represent common allergens and other pathogens. Considering the variety of microorganisms and their characteristics, it is virtually impossible to quantify their concentrations in a form of tolerable levels of exposure.

Building dampness and mould are present even in high-income countries. The dampness and mould are traditionally related to overcrowded accommodations without adequate heating, ventilation and insulation. Climatic changes such as global warming with more frequent occurrence of storms and heavy rains lead to gradual increase in sea level. Together with more frequent floods, it results in increase in percentage of buildings affected by dampness and mould. Increased indoor dampness provides optimal conditions for increased growth of biological agents, such as fungi.

The presence of fungi in indoor air is result of transportation from outside environment via building materials, carpets, furniture, wallpapers, etc. Ventilation and air-conditioning systems are another common ways of penetrating of fungi into the buildings. The rate of further growth, spreading and multiplication depends exclusively on moisture content in indoor air, regardless the type of surface. Even the primary colonizers, or *xerophilic* fungi, which may grow on less moisture surfaces, require relative humidity in excess of 50%. Secondary colonizers require more humidity in their substrates, while tertiary colonizers, or *hydrophilic*, need sheer water content in liquid phase for their germination and mycelia growth (3); hence, they are present only in buildings with severe condensation problems. The natural food source for fungi vary from plant, animal and human particles in house dust, to fragments of construction materials such as floor and wall textile coverings, furniture, residua of cooking traces, food storage, paper materials. Since these materials are in ample in every building, and considering that optimal temperature for fungi growth ranges from 10-35 ºC, the only limiting factor for development of fungi and mould contamination is dampness. Fungi may be extremely harmful for human health, but may also destruct the building itself, particularly the wooden parts, such as roofs, timbers, and other materials.

Some fungi species produce strong allergens, which initiate immune reaction type I (IgE mediated). For example, the indoor contamination with *Alternaria*, *Penicillium*, *Aspergillus* and *Cladosporium* spp., is related to asthma and other allergic respiratory diseases. Some of

these species, such as *Penicillium* and *Aspergillus* can also induce type III allergy (IgG mediated), while at high concentrations, may also initiate combined type III and IV reaction manifested as hypersensitivity pneumonitis. Major fungal allergens are isolated and identified (such as Cla h I from *Cladosporum herbarum*, Alt a I and Alt a II from *Alternaria alternata* and Asp f I and Asp f III from *Aspergillus fumigatus*). Most of them are glycopeptide enzymes, produced during germination and released through spores and hyphae, i.e. live particles (4).

Nevertheless, even dead particles carry substantial health risk, because they may contain possibly harmful (1→3)-β-D-glucans with the potential to impair respiratory functioning (5), and mycotoxins. The harmful effect of mycotoxins is manifested by interference with RNA synthesis leading to DNA damage. Sometimes this toxicity is beneficial – e.g. penicillin, a strong bactericidic antibiotic, is a mycotoxin produced by fungi *Penicillium*. But, in general, fungi mycotoxins have strong genotoxic, cancerogenic, and immunotoxic potential. The cancerogenic effects of aflatoxin (mycotoxin produced by *Aspergillus flavus* and *Aspergillus parasiticus*) are well known. The most important mycotoxins related to indoor air contamination are trichotechens, generated by fungi *Stachybotrys chartarum* (macrocyclic trichotechens, trichodermin, sterigmatocystin and satratoxin G) (6).

Several fungi also produce volatile organic compounds as the result of their metabolic processes, but their effects on human health are yet to be investigated.

The assessment of fungi contamination in indoor air is very difficult. In study conducted by Pietarinen et al., culture methods identify only few of species that were recognized and quantify by quantitative PCR (7). *Penicillium, Aspergillus* and *Streptomyces* were predominantly indentified by both methods. But, culture method successfully indentified *Aspergillus fumigates* only in samples containing the amount of total viable fungi more than 10^6 cfu/g. Likewise, culture method was able to detect *Stachybotrys chartarum* only in samples with very high level of fungi contamination, contrary to qPCR method. These results are in agreement with another Finnish study which confirmed the highest prevalence of *Penicillium/Aspergillus* species in house dust, with more precise results obtained by qPCR method (8). Same authors indicated that concentrations of fungi differ significantly between seasons with the highest concentrations of *Aspergillus* detected in winter (more that 10000 cells/mg of dust).

There are major problems in detection, identification and quantification of fungi in indoor environments. A study conducted in Finland indicated that culture method failed to detect *Aspergillus fumigates*, while qPCR in same samples detected the average of 2,21 x 10^3 cells/g. The average concentrations of *Penicillium spp.* and *Aspergillus spp*. were significantly lower when detected by culture method than qPCR (9,01 x 10^3 cfu/g vs. 1,96 x 10^5 cells/g and 1,35 x 10^4 cfu/g vs. 5,44 x 10^6 cells/g, respectively) (9).

Epidemiological, clinical and toxicological evidence suggest that microbiological contamination of indoor air may be related to numerous diseases and health conditions. Damp and humid environment are obligatory factors for growth, development and multiplication of microbes, hence, the main public health goal should be targeting these problems. Considering the variety of microorganisms, possible synergistic effects, the fact that the most endangered populations are children, women, elderly (who spent relatively substantial time indoors), disadvantages of determination techniques and lack of evidence-based risk assessment, it should be concluded that further investigations are needed.

References

1. Cox-Ganser J, Park JH, Kanwal R. Epidemiology and health effects in moisture-damaged damp buildings. In: Goldstein WE, ed. Sick Building Syndrome and Related Illness. Boka Raton: CRC Press, Taylor & Frances Group; 2011.
2. World Health Organization (WHO). Guidelines for indoor air quality: dampness and mould. Copenhagen: WHO Regional Office for Europe, 2009.
3. Grant C, Hunter CA, Flannigan B, Bravery AF. The moisture requirements of moulds isolated from domestic dwellings. Int Biodeterior Biodegrad 1989; 25:259-84.
4. Green BJ, Tovey ER, Serkombe JK, Blachere FM, Beezhold DH, Schmechel D, et al. Airborne fungal fragments and allergenicity. Med Mycol 2006; 44(Suppl.1):S245-55.
5. Douwes J. (1→3)-β-D-glucans and respiratory health: a review of the scientific evidence. Indoor Air 2005;15:160-9.
6. Bloom E, Bal K, Nyman E, Must A, Larsson L. Mass spectrometry-based strategy for direct detection and quantification of some mycotoxins produced by *Stachybotrys* and *Aspergillus* spp. in indoor environments. Appl Environ Microbiol 2007; 73:4211-7.
7. Pietarinen VM, Rintala H, Hyvatinen A, Lignell U, Karkkainen P, Nevalainen A. Quantitative PCR analysis of fungi and bacteria in building materials and comparison to culture-based analysis J Environ Monitor 2008; 10:655-63.
8. Kaarakainen P, Rintala H, Vepsalainen A, Hyvarinen A, Nevalainen A, Meklin T. Microbial content of house dust samples determined with qPCR. Sci Tot Environ 2009; 407: 4673-80.
9. Lignell U, Meklin T, Rintala H, Hyvarinen A, Vepsalainen A, Pekkanen J, et al. Evaluation of quantitative PCR and culture methods for detection of house fungi and streptomycetes in relation to moisture damage of the house. Lett Appl Microb 2008; 47: 303-8.

2. MAN'S HEALTH AND ENVIROMENTALLY-INDUCED DEVIATIONS

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Improvement of the coherency of different noise reduction actions requires changes in the overall approach to noise problem involving a new strategy to improve the accuracy and standardization of data.

The structure of new future noise policy has to be based on the Directive on the Assessment and Management of Environmental Noise, 2002/43/EC. The Directive defines the three key elements: assessment of environmental noise through strategic noise mapping, implementation of action plans to reduce noise where necessary and information for the public about noise levels and its effects. The Directive defines the common noise indicators and methods for strategic noise mapping as well as the deadline for the Directive implementation.

Keywords: noise, noise mapping , directive.

3. THE IMPORTANCE OF IMPROVING MENTAL HYGIENE AT HEALTH CARE WORKERS

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Abstract
Metal health involves emotional stability, and healthy emotional relationships with other people. Prevention and mental health care, most often defined as a common application of psychological, medical and social measures aimed at elimination of harmful factors of human life. Working in health care brings with it a number of factors that their presence may adversely affect the mental health of employees. Specific health problems caused by risk factors in the workplace related to the occurrence of stress, burnout, anxiety, irritability and depression. Improving mental hygiene in health care workers is rank very important to preserve their mental health. Promotion of mental health care requires a multidisciplinary approach through the implementation of specific methods and programs that aim to allow healthcare workers to make the best possible overcome stress factors in work environment and raising awareness of the need for the improvement and maintenance of their mental health.

Keywords: mental hygiene, mental health, health care workers.

Healthcare is consistently ranked as among the most stressful fields to work in perhaps due to a combination of the difficulty of the work itself, budget cuts, a high turnover of employees, and staff shortages. Health care occupations have long been known to be highly stressful and associated with higher rates of psychological distress than many other occupations.

Health care workers in the health care sector is particularly subjected to such mental health risks (1).

Mental hygiene is the branch of psychiatry that deals with the science and practice of maintaining and restoring mental health, and of preventing mental disorder through education, early treatment, and public health measures.

According to the WHO (2), mental health can be conceptualized as ‘a state of well-being in which the individual: realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to his or her community.

Pychosocial risk factors have a greatinfluence on employees’ physical and mental

health.These risks depend of the way work is designed, organised and managed.

The specific health problems caused by these risk factors may include: stress, burnout, anxiety, irritability i depression

The National Institute for Occupational Safety and Health (3) defines occupational stress as “the harmful physical and emotional responses that occur when the requirements of the job do not match the ca-pabilities, resources, or needs of the worker.”

Causes of stress can be: internal (arising from within the individual) and external (arising from the external events and demands).The effects of stress can be:physical,psychological,behavioural and cognitive.

The following workplace factors (job stressors) can result in stress: work overload, lack of task control, role ambiguity, poor interpersonal relations, unfair management practices,financial factors,conflict between work and family roles and responsibilities, lack of opportunity for growth or promotion, lack of management commitment to core values, conflicting communi-cation styles, etc.(4).
The causes of work related stress can be many and varied, but can be broadly classified into 3 groups:stress from doing the job(caused for example by monotonous work, too much work or insufficient time),stress from work relationships (due for example to poor teamwork, complex hierarchies of authority, working in isolation or bullying and harassment) and stress from working conditions (due for example to shift work, dealing with life - threatening injuries, illnesses and patient deaths or the threat of violence and aggression) (5).

Two important definitions of burnout are (6):

- "A state of physical, emotional, and mental exhaustion caused by long term involvement in emotionally demanding situations." – Ayala Pines and Elliot Aronson.
- "A state of fatigue or frustration brought about by devotion to a cause, way of life, or relationship that failed to produce the expected reward." – Herbert J. Freudenberger.

Copenhagen Burnout Inventory assesses burnout status using three dimensions: personal burnout, work-related burnout and client-related burnout.

Burnout has many causes. They fall into the main categories relating to job structure, lifestyle features, and individual personality characteristics. Classic symptoms include the following: depleted physical energy, emotional exhaustion**,** lowered immunity to illness**,** less investment in interpersonal relationships, increasingly pessimistic outlook**,** increased absenteeism and inefficiency at work**.** Specific symptoms of burnout include: having a negative and critical attitude at work,dreading going into work, and wanting to leave once you're there,having low energy, and little interest at work,having trouble sleeping,being absent from work a lot,having feelings of emptiness,experiencing physical complaints such as headaches, illness, or backache,being irritated easily by team members or clients,having thoughts that your work doesn't have meaning or make a difference,pulling away emotionally from your colleagues or clients,feeling that your work and contribution goes unrecognized,blaming others for your mistakes,thinking of quitting work, or changing roles (7,8,9).

Stress is often relatively short-term, and it is often caused by a feeling that work is out of control. However, once the situation changes, stress often lessens or disappears entirely. Burnout often takes place over a longer period. Burnout can cause a variety of health problems including sleeplessness, physical ailments and sicknesses, depression, and even substance abuse.

According to Pollett (10), mental health promotion is ‘the process of enhancing protective factors that contribute to good mental health’.

Organisational level interventions include: improving quantity of work, to optimise intellectual requirements, to reduce time pressure, improving the use and development of skills, to enhance control over work, to increase participation in decisions, improving social support among colleagues, and between colleagues and superiors, introdusting flexible

working hours, to provide childcare services at work, to allow study leave and career breaks, to enable employees to plan and implement rotas based on work rota autonomy (11)**.**

The most commonly implemented organizational interventions in health care settings includeteam processes, multidisciplinary health care teams and multicomponent interventions.

Team processor worker participatory methods give workers opportunities to participate in decisions and actions affecting their jobs. Workers receive clear information about their tasks and role in the department. Team based approaches to redesign patient care delivery systems or to provide care, have been successful in improving job satisfaction and reducing turnover, absenteeism, and job stress (12).

Multidisciplinary health care teams (e.g., composed of doctors, nurses, managers, pharmacists, psychologists, etc.) have become increasingly common in acute, long-term, and primary care settings. Teams can accomplish the following: allow services to be delivered efficiently, without sacrificing quality, save time, promote innovation by exchanging ideas, etc. (13,14).

Multicomponent interventionsare broad-based and may include risk assessment, intervention techniques, and education.

Work-related stress in healthcare systems is a major challenge to the health of those who work in those systems, to the healthiness of their organisations and to the effectiveness of the healthcare that they deliver. The development of the action plan, based on the evidence from the risk assessment, involves deciding on: what is being targeted, how and by whom, who else needs to be involved, what the time schedule will be, what resources will be required and how the action plan will be evaluated (15).

Mindfulness-based stress reduction program consists of a training to improve communication skills, learn how to deal with stress reactions, self-compassion; training to improve practical skills to reduce stress, and to improve relation and functioning with patients.

Conclusion

Maintaining good mental health is crucial to living a long and healthy life. A multidisciplinary treatment approach, group care, and case management are common features of mental health treatment settings only rarely used at health care workes. Mental health interventions aimed at preventing and combating burnout need to be directed at the organizational, as well as the individual, and the societal level.

References

1. World Health Organization, ‘Prevention of mental disorders. Effective interventions andpolicyoptions’,2004,1-67.Availableat: http://www.who.int/mental_health/evidence/en/prevention_of_mental_disorders_sr.pdf
2. World Health Organization. Mental health. Retrieved 22 September 2009, from: http://www.who.int/topics/mental_health/en/
3. Department of health and human services centers for disease.Control and prevention national institute for occupational safety and health exposure to stress occupational hazards in hospitals. Publication No. 2008–136.
4. Bhui KS, Dinos S, Stansfeld SA, White PD. A synthesis of the evidence for managing stress at work: a review of the reviews reporting on anxiety, depression, and absenteeism. J Environ Public Health. 2012;2012:515874.

5. Conway PM,Campanini P, Sartori S, Dotti R, Costa G. Main and interactive effects of shiftwork, age and work stress on health in an Italian sample of healthcare workers. Appl Ergon. 2008; 39(5):630-39.
6. Landsbergis P.Occupational stress among health care workers: A test of the job demands-control model.Journal of Organizational Behavior.2006;9(3):217–239.
7. Ahola, K., Kivimäki, M., Honkonen, T., Virtanen, M., Koskinen, S., Vahtera, J., Lönnqvist, J.Occupational burnout and medically certified sickness absence: A population-based study of Finnish employees. Journal of Psychosomatic Research, 2008,64, 185-193.
8. Shanafelt, T.D., Bradley, K.A., Wipf, J.E., Back, A.L. Burnout and self-reported patient care in an internal medicine residency program.Annals of Internal Medicine,2002,136, 358-367.
9. Wood BD, Killion JB.Burnout among healthcare professionals.Radiol Manage.2007;29(6):30-4.
10. Pollett, H., 'Mental health promotion: a literature review.' Prepared for the Mental Health Promotion Working Group of the Provincial Wellness Advisory Council. June 18th 2007.
11. Bourbonnais R, Brisson C, Vinet A, Vézina M, Abdous B, Gaudet M. Effectiveness of a participative intervention on psychosocial work factors to prevent mental health problems in a hospital setting. Occup EnvironMed 2006,63:335–342.
12. Murphy LR. Stress management at work: Secondary prevention of stress. In: Schabracq MJ,Winnubst JAM, Cooper CL, eds. The handbook of work and health psychology. New York: Wiley, pp. 2003,533–548.
13. Marine A, Ruotsalainen J, Serra C, Verbeek J.Preventing occupational stress in healthcare workers. Cochrane Database Syst Rev. 2006;18;(4):CD002892.
14. Ruotsalainen J, Serra C, Marine A, Verbeek J.Systematic review of interventions for reducing occupational stress in health care workers.Scand J Work Environ Health. 2008 ;34(3):169-78.
15. Wyk BE, Pillay-Van Wyk V. Preventive staff-support interventions for health workers.Cochrane Database Syst Rev. 2010;17;(3):CD003541.

4. BALNEOCLIMATOLOGY RESEARCH AND PUBLIC HEALTH

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Abstract

Serbia has excellent geographical, geological and meteorological conditions for development of balenoclimatology – mineral waters, gases and peloids, as well as the appropriate climate. These natural medicinal factors can be applied both in the therapy (balneotherapy) and the prevention of diseases (balneoprevention).

The scientific community for the most part focuses on the researches in the efficiency of balneotherapy while balneoprevention is considered a relatively new approach in balneology.

The purpose of this paper is to present a historical review of the development of balneoclimatology as a part of the public health, from the ancient times till present days.

Key words: Balneoclimatology, history, public health

Introduction

Balneology is a medical discipline that deals with the action of natural physical and chemical factors of the environment on the human organism and the possibility of using them for medical purposes. Deals with the action of balneological factors and possibility of using them for medical purpose mineral waters with varyng degrees of mineralization, temperature and radioctivity, peloids of organic or inorganic orgin havig suitable chemical composition and physico chemical properties and therapeutic gases of varyng composition, including ones having adequate amounts of radioactive emanations (radon). Human bioclimatology treats the relationship between the human organism and the climate and the direct effect of weather conditions on health and the sickness (1).

Balneoclimatology is not completely recognized as an independent specialist branch of medicine at the international level by the European Union of Medical Specialists -UEMS. In some countries it is recognized as a branch of physical medicine (Poland, Slovakia, and Romania), while in the UK**,** the Netherlands, Sweden, and Denmark there are no similar medical specialties. In many countries (Germany, Austria, Poland, Hungary, France, Japan, and others), it is known as *Health Resort Medicine, Balneology, Medical Hydrology*) (2). According to the currently applicable "Regulations on specializations" from 2003, this subspecialization can be completed by all medical specialists (with the exception of social medicine specialist).

This situation indicates that this scientific branch is in the need of a holistic and multidisciplinary approach.

History of balneoclimatology

The ancient Egyptians, Sumerians, Babylonians, and Aztecs, like the Greeks and Romans of centuries ago, used water both for religious rituals and for medical purposes. Starting with Homer, bathing has been used for hygienic purposes, while Asclepiades (124 BCE) recommends the use of water (bathing and drinking) in the treatment and also in the prevention of diseases.

In his *Corpus Hippocraticum (*part *De aere, aquis et locis*to), Hippocrates (460–370 BC) was one of the first to point out to the influence of the living environment on one's health.. He deduced that the diseases occur as a result of the imbalance of fluids in the organism, and that in order to prevent and treat a disease, apart from the recommended water cures (drinking water and bathing), one should also use walking and massages. The baths were often combined with sports and education (3).

In the Mesopotamia, in 2500 B.C., clay was used for medicinal purposes, while in the ancient Egipt, anti-inflammatory and antiseptic properties of clay were well known and frequently used.

The ancient Greeks applied the treatment termed "Heliosis", during which they would expose themselves to the sunlight on the terraces of their houses for purposes of treatment and general improvement of health. In 525 BCE Herodotus associated the strength of the skull to sunlight exposure claiming that skulls of the Persians were more sensitive to hits than those of the Egyptians who cut their hair short and exposed their heads to sunlight (4).

Following the example of the Greeks, the Romans opened numerous thermae with a capacity for thousands of people, where very hot waters were used for renewing their appetites and thirst. Spas were used not only for the recovery of the injured but also for the relaxation of healthy soldiers. Apart from bathing they also applied exercises, socializing, relaxation, worship and medical treatment. With the fall of the Roman Empire in 476 A.D, and the advent of Christianity the culture of bathing gradually disappeared.

In the 13th century, under the influence of the Moors, Europe opens first public baths, but during the renaissance they were closed due to occurrence of syphilis, plague, and leprosy, and also as places of gathering of political and religious dissidents. The currently used word "spa" may be derived from the Walloon word "espa" which means fountain, or from the name of the Belgian town Spa (in the 14th century) boasting a thermal spring.

During the 16th century several Italian doctors discovered forgotten medical texts from the ancient times leading to the recognition of value of balneology. Medicinal waters have been studied at that time and efforts have been made to determine their effects on health. In 1571, Bacci published De thermis, in which he taught the art of the baths from Galen and the Aristotelians. Minardo published in 1594 a compendium on the two baths in Verona. The first bath was used for drinking and bathing, the second was used by bathers with skin conditions, for bathing of animals, and for washing off therapeutic mud. The treatments consisted of drinking cures, bathing, purging, and application of mud. This new culture of bathing spread from Italy to the rest of Europe. Hotels and lodgings next to the springs of mineral water started to abound both across Europe and in the North America. Every larger spa had its own theater, casino and promenades next to the buildings dedicated to bathing and resting. Spas became gathering points for the elite but also for artists: painters, writers and composers (3).

At the beginning of 20th century, women generally and especially if belonging to higher social classes were encouraged to avoid exposure to sunlight. Nevertheless, two facts will soon

change this situation. Sunbathing becomes cosmetically popular and Niels Finsen uses ultraviolet rays (UV) to treat tuberculosis and receives the Nobel prize (1903) for his work. Subsequently, heliotherapy gains international popularity. In Switzerland, dr A. Rollier opens a clinic for treatment of tuberculosis and rickets, and also promotes heliotherapy as a good prevention for theses diseases. Medical handbooks of the time describe more than two hundred conditions where UV light has beneficial therapeutic effects and heliotherapy becomes a part of the public health. This lasts until 1930 when the correlation between skin cancer and extreme exposure to sunlight was made public and proved in the experimental studies (4).

Today the importance of heliotherapy for the creation of the vitamin D is well known, which is important for the prevention of rickets and promotion of health of the bones as well as for the prevention of autoimmune diseases, cancers and cardiovascular diseases (5).

From what is previously said it evident that throughout the major part of the history balneoclimatology was considered to be of public health importance.

Balneoclimatology today

Today, when in the majority of cities in Serbia people doubt the quality of the tap water and buy bottled mineral water, the intake of this water can have a beneficial effect on the activity of the gastrointestinal system, ionic balance of the organism, and excretion. Consequently, balneological factors have today public health significance. The researches in balneoprevention should be therefore focused towards two directions (6).

Primarily, preventive aspects of balneotherapy can be investigated mainly with (interventional or experimental) epidemiological methods (i.e. the analysis of the consumption of mineral waters in population).

Secondly, balneoprevention should also involve toxicity studies on chemical substances found in mineral waters and muds (peloids), with mutagenic, carcinogenic or other specific toxic components, either of mainly geochemical origin or as a secondary contamination (i.e. pesticides).

All these researches are a part of balenoclimatology and involve specialists of preventive medicine, which points out to the necessity of a holistic and multidisciplinary approach to this branch of medicine.

Conclusion

Balneoclimatology had a significant role throughout human history in the preservation and improvement of health of the population in general, more often greater than balneotherapy itself. Further researches should be directed to the potential of natural factors for prevention of diseases, as well as to the research of the safety of their application from the aspect of the possibility of toxic and microbiological contamination.

References

1. Jovanović T i sar. Balneoklimatologija. Medicinski fakultet Beograd. Univerzitet u Beogradu. CIBIF, Beograd, 1994.

2. Gutenbrunner C, Bender T, Cantista P, Karagülle Z. A proposal for a worldwide definition of health resort medicine, balneology, medical hydrology and climatology. Int J Biometeorol. 2010 Sep;54(5):495-507
3. van Tubergen A, van der Linden S. A brief history of spa therapy. Ann Rheum Dis. 2002;61(3):273-5.
4. Payne ET. Light: Friend or Foe?. The Proceedings of the 13th Annual History of Medicine Days. Faculty of medicine the University of Calgary. March 19th and 20th, 2004; pp. 142-147.
5. Holick MF. Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. Am J Clin Nutr 2004;80(6 Suppl):1678S-88S.
6. Varga C. Balneoprevention: new approaches. Int J Biometeorol. 2012;56(1):195-7.

ORAL PRESENTATIONS

1. EMERGENCIES IN DRINKING WATER SUPPLY

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Emergencies in the water supply are regulated by national law. The reasons for emergency were blurring sources with or without a breakdown of the parts of the water supply as a result of flooding and enormous amounts of rainfall.

The aim of the study was to review emergency water supply in the territory Nisava and Toplica region through the work of field and laboratory teams IPH Nis worked part-time intensive monitoring of drinking water which results are presented in this paper.

A total of 1081 samples of drinking water from municipal water supply, from 19.4. to 23.5.2014.godine. Numbers of samples per municipality are distributed over time. Supplying the population with water through mobile tankers and attempts improvised stationary water tanks of the Red Cross of Serbia were strictly controlled and supported made mandatory procedures especially for filling hydrants, disinfection of means of transport and circulation of water.

It is not enough just the implementation of the legal framework of the action plan for dealing with emergencies, but the real application of a known field. Only then it is possible in a short period of time to ensure a safe water supply and to maintain the health of the population.

Key words: emergencies, drinking water, water supplying system, water tank, health

2. THE IMPORTANCE OF BACTERIAL CONTAMINATION DETECTION ON MOBILE PHONES IN HEALTH CARE FACILITIES

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Hands and instruments, as well as cellular telephones, used by healthcare workers and patients could play an important role in the spread of the hospital infections.
Objectives: The aim of this study was to investigate bacterial contamination of the mobile phones of the healthcare workers in hospitals, in order to find possible preventive measures and to draw the attention of healthcare workers to this topic.
Materials and methods: The study was carried out collecting swab samples from mobile phones of attending healthcare staffs from different departments of Clinical Center, Nis. Each participant was asked to fill up questionnaire regarding patterns of usage. Samples from the mobile phones of healthcare workers (n=210) and from the mobile phones of non-healthcare workers (n=70) were collected without intimation. The bacteria determined by using standard microbiological procedures.
Results: Hygiene practice of healthcare workers about using mobile phones were not satisfactory. Microbial analysis revealed 71,4% investigated mobile phones contaminated by different type of bacteria, and 16.7% of them grew bacteria known to cause nosocomial infections.
Conclusion: Our results confirmed that the mobile phones of healthcare workers may become reservoir of microorganism for nosocomial infections and developing preventive strategies is of great importance.

Key words: health personnel, mobile phones, bacteria, nosocomial infections

POSTER PRESENTATIONS

1. ANTIOXIDATIVE ACTIVITY, TOTAL ANTHOCYANINS, POLYPHENOLS AND TANNINS CONTENT OF BLACK CURRANT (*Ribes nigrum* L.) VARIETY OMETA

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Objectives: Black currants are berries with the high contents of anthocyanins, flavonoid and ascorbic acid. These constituents are known to take part in both, antioxidative and biological activity and ameliorate and prevent diseases such as chronical noncommunicable diseases. The aim of this research was to determine the contents of total anthocyanins, polyphenols and tannins and to see how they would correlate to the antioxidative activity of black currants variety Ometa.

Materials and Methods: The juices used for the experiment, were made from the fresh, undamaged samples of berries, collected during 2008, 2009 and 2010. The total amount of anthocyanins was determined according to European Pharmacopeia 6.0. and expressed as cyanidine-3-glucoside chloride. The total phenolic and tannins contents were determined using Folin-Ciocalteu method by Hagerman. The antioxidant capacity was evaluated using two complementary *in vitro* tests - DPPH system and β-caroten/linoleic acid model.

Results: The highest total anthocyanins content were found in Ometa 2008 (0.2%). The best inhibition of lipid peroxidation in β-carotene-linoleic acid emulsion was observed in Ometa 2009 (0.08 mg/ml). Statistically significant differences were found between years in all tested parameters.

Conclusion: Ometa variety stands out due to the largest number of beneficial characteristics. Therefore all the presented facts may contribute greatly in related further research.

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

Keywords: black currants, antioxidative activity, total anthocyanins, total polyphenols

2. RESEARCH: HOW WELL CONSUMERS UNDERSTAND NUTRITIVE AND HEALTH CLAIMS ON FOOD PRODUCTS

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Objectives: Diseases of modern man are increasingly associated with the manner and quality of food consumption. The first contact with food the consumers realize through labels on the products, they provide basic information about the quality, quantity and composition of the food product. The aim of this study was to determine how the information provided by the declaration of foodstuffs is understandable to the average consumer, how much of it do they believe and how much the nutritional information is a criterion for the selection of a particular product.

Materials and methods: The study was conducted on 500 respondents who filled out a provided form. Filling out the form was either directly or on the website of the Association of Serbian consumers (www.apos.org.rs) in May and June 2014. The form had four personal questions about the respondents (gender, education, age and whether they have allergies), 5 questions about consumer habits (frequency of buying and reading the declarations, if they believe the information on the label and if so, which information) and 12 questions which would clearly show whether consumers understand the information in the declaration. Of these 12 questions, respondents were offered the correct answer, 2-3 incorrect answers and the answer - I do not know.

Results: The structure of the respondent group: Females 58.3%, of which 37.4% were in the age group 36-55, and 33.5% in the age group 26-35. University graduates 55.8% and high school graduates 31.1%. Of all respondents 69.3% sometimes read the declaration, while 41.3% go shopping 3-5 times a week. Problems with allergies had only 9.2% of respondents. Asked how allergens are declared only 6.3% knew the answer, while the nutritional claim “with a small amount of fat” only 14.2% of them understood. The difference between nutritional claim “rich in fiber” and “source of fiber” knew only 29.5% of respondents. How trans fatty acids should be declared knew up to 49.6% and what exactly are probiotics 64.6% of respondents answered correctly. The accurate health claim for potassium knew 47.4% of respondents.

Conclusion: It is necessary to educate consumers, since the total of correct answers was only 38.3%; incorrect answers 25.1% and even 36.6% of the responses were “I do not know”. The educating is needed to be done by: manufacturers, responsible ministries, research institutions and consumer protection associations. The results show that consumers do not understand the basic nutritional information. Manufacturers who have products with quality ingredients need to use marketing campaigns to explain the effect of these ingredients on human health. Nutritional information and the entire food label must become the basis for selecting food products, so as to improve existing eating habits and maintain and improve the overall health of the nation.

Key words: Nutrition claims, health claims, food labels, nutrition, declaration, consumer

3. SO_2 AIR CONCENTRATION IN THE LIGHT OF THE USING NEW TYPES OF DIESEL FUEL

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Introduction: The main sources of SO_2 in the air are the combustion of fossil fuels, containing sulfur, and coal and oil. Sulfur dioxide is presented in the exhaust of motor vehicles, especially diesel engines. Use of new types of diesel fuel with lower sulfur content and more modern vehicles with lower emissions of pollution resulted in the decrease of concentration of SO_2 in the air .

Objectives: To evaluate the effect of the use of new types of diesel fuel with a concentration of SO_2 in the air.

Methods: Data on consumption of different types of diesel fuel (compared to the period of the adoption of the Regulation on conditions of import of motor vehicles for the area of Kosovo and Metohija) were obtained from the relevant services. In the period since 2009. to 2013., the immission of SO_2 was monitored at locations - Kosovska Mitrovica and Zvecan. Sulfur dioxide concentration was determined by spectrophotometry - pararosanylin method (TSMF). Statistical hypotheses were tested at statistical significance level of 0.05

Results: The implementation of the Regulation has caused an increase to more modern types of diesel fuel. Median value concentration of the SO_2 in the area of research was 9.16 $\mu g/m^3$. The lowest measured concentration of SO_2 was 0.02 $\mu g/m^3$. and the highest 95.81 $\mu g/m^3$. Median values of the concentration SO_2 before the implementation of the Regulation (2009.) was 12.58 $\mu g/m^3$ (range, 4.36 to 67.2) and after the implementation 2010-2013. was 8.36 $\mu g/m^3$ (range, 0.02 to 95.81), which is a statistically significant difference ($p < 0.001$).

Conclusion: The use of new types of fuels with reduced sulfur content led to the decrease in the concentration of SO_2 in the air.

Keywords: diesel fuel, air, sulfur dioxide.

4. MONITORING NUTRITIONAL QUALITY OF MEALS IN PRESCHOOL CHILDREN FROM 4-6 YEARS IN KINDERGARDEN IN KICEVO R.M. FOR THE 2001-2013 PERIOD

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Purpose: To evaluate the biological value and presence of salt in the diets of pre-school children,to assess the sanitary condition and propose corrective measures.

Materials and Methods: Statistical data is made from the examinations of biological energy-consumptive values of the analytical method in the period 2001-2013y. in accordance with the recommendations of the W.H.O in 2004y.

Data from tests for hygienic laboratory are made according to the Regulations for Food Safety and Food Security by microbiological criteria,Fig.Journal R.M.br.78/2008.It's used retrospective statistical method of operation. **Results**:Of the 100 analyzed daily meals in average energy value,carbohydrates,vit.B2 and C are satisfying.Proteins and Vit.A share of surplus,vitamins B1,PP,B6 and minerals are with a deficit.Daily amounts of salt not exceeding 2grams.After groups groceries shortage occurs in the meat,vegetables and fruit but milk is in surplus.Of 86 bacteriological swabs only 1(1%)does not match.

Conclusion: Nutritional quality of meals for children do not correspond to the large daily variations and has no differens compared with the period 2001-2005y.The quantity of salt,milk and diversity of vegetables,fit the regulations and the amount of the vegetables,fruits and meat are deficient. It is the addition of larger quantities of meat,vegetables and fruit to be balanced meal to reduce the risk of diseases.

Key words: Children's food,nutrients,deficit,prevention.

5.TRACKING BIOLOGICAL VALUE OF HOSPITAL FOOD IN GENERAL HOSPITAL

KICEVO R.M FOR THE 2001-2013 PERIOD

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Public Health Center – Bitola- Kicevo, R.Macedonia

Aim: To assess the biological value of food to patients, quality of meals, the risk of food safety and to suggest possible remedial measures.

Materials and Methods: Statistical data is made from the examinations of biological energy-consumptive values of the analytical method in the period 2001-2013y. in accordance with the recommendations of the W.H.O in 2004y.

Data from tests for hygienic laboratory are made according to the Regulations for Food Safety and Food Security by microbiological criteria,Fig.Journal R.M.br.78/2008.It's used retrospective statistical method of operation.

Results: Of the 140 analyzed daily meals in average energy value is 2161kkal and vit.B2 are within the recommended value.Deficit occurs 20%carbohydrates,28%iron,55% in vit.C. Surplus is 14% protein,28% fat and 17% calcium.After the groups groceries prevalent enough milk and milk products and meat,while major deficit vegetables(45%) and fruit (77%).Daily amounts of salt not exceeding 3grams.Examined samples of drinking water are all correct.Bacteriological failure to swabs is reduced from 18 % to 9 %.

Conclusion: Sanitary-higienical condition in the period 2009-2013y. is much improved biological floor value of the food is with great variation and almost has no different compared to previous period 2001-2005y.It is recommended correction of the menu to improve the entry minerals and protective substances.

Keywords: Hospital food,nutrients,prevention.

6. SIGNIFICANCE OF CONTINUOUS MONITORING OF WATER SUPPLY FOR THE HEALTH OF POPULATION IN ZAJECAR AND BOR DISTRICT

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Abstract

The aim of work 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 the city`s water supply from year 2011th to 2013th. A total sample is 3658 in Bor district and 3504 in Zaječar district. Sampling was done by the authorized person at the exactly prescribed methodology.

The analysis of physical and chemical parameters indicated that the highest percentage of irregularity is for turbidity and consumption of $KMnO_4$ in Majdanpek with 46,17%. Percentage of microbiological irregularity of water is much lower because of chlorinated water in city`s water supply.

Conclusion: Water supply should be controlled and continuously monitored, not only city`s water supply but also rural water supply, in order to react preventively and protect health of population.

Keywords: water, health, population.

7. CONTINUOUS MONITORING OF DEVELOPMENT WATER AND HEALTH SAFETY OF DRINKING WATER IN THE NEWLY ESTABLISHED MUNICIPALITIES IN KICEVO R.MACEDONIA IN THE PERIOD 1996-2013 YEAR

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Objective: The aim of this paper is to give a realistic assessment of the development of water supply in Kicevo municipalities by type of facilities,and recommend appropriate preventive measures to prevent pollution of drinking water.

Materials and methods: Water supply will be shown through statistical-data information from local government to municipalities,laboratory analysis of hygienic quality of drinking water between 1996-2013y.(According to the Standard Methods of Regulation for water safety OJ RM 46/2008),epidemiological report on the movement of intestinal infectious diseases.Applied is a descriptive epidemiological and statistical method to work.

Results: From 56.734 population in Kicevo and the villages in 1996y.29.261(52%) residents are supplied with water from the city water,hygienic aspect is correct.The remaining 48% rural population (76 villages) received drinking water from 34(45%)local water supply and 42(55%)other types water supply facilities.Between 2001-2005y.from other water supply facilities received drinking water 14(20%)and from 2006-2013y.are supplying only 8 villages and 5% of the total population.

Conclusion: That the mass construction of water supply from 2001 to 2013y.improve the quality of drinking water,which certainly reflects on the morbidity of intestinal infectious diseases and the trend decline.Necessary to continue to meet our educational services to the population and taking all preventive sanitary-hygienic and anti-epidemic measures.

Key words: Development of water supply in Kicevo,prevention

8. STUDENTS' AWARENESS OF THE LINK BETWEEN SALT INTAKE AND HEALTH

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Objectives: The objective of this research was to assess the awareness of the link between high salt intake and health among students from University of Novi Sad.
Materials and methods: The research was carried out in a convenient sample of 1082 students (mean age 20.9±1.9 years, 38.9% males) at the University of Novi Sad, Serbia. Students' awareness of the link between salt intake and health was assessed by a questionnaire.
Results: Majority of the respondents (92.9%) were aware that high salt intake poses a health risk. This percentage was higher among females than among males (95.0% vs. 89.5%, p=0.001). Health problems associated with high salt intake were hypertension (82.9%) and heart problems (64.3%), followed by stroke (35.0%) and obesity (31.7%). Only 3.8% of students recognized stomach cancer as a salt-related health issue. Levels of awareness of specific salt-related health problems was consistently higher among female respondents (p<0.001).
Conclusion: Awareness of the link between salt intake and health was high, but substantial knowledge gaps exist about specific salt-related health problems that need to be addressed in future students' education programs.

Key words: Salt intake; Sodium intake; Students; Hypertension

9. URINARY COTININE AS A BIOMARKER OF EXPOSURE TO ENVIRONMENTAL TOBACCO SMOKE

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Measuring of specific smoke constituents or their metabolites in physiological liquids can give more precisely data about exposure to ETS. Although several parameters have been explored, urinary cotinine detection is the most frequent. Cotinine, a metabolite of alkaloid nicotine - the major component of tobacco smoke has a much half/life than nicotine and this is considered a more useful marker in assessing tobacco use.

The aim of this paper was to established the relationship between parent-reported estimates of children's exposure to ETS at home and children's urinary cotinine levels.

The study sample consisted of 1074 children aged 7 to 11 years from Nis. Children are chosen because their lungs are more susceptible to harmful effects from air pollutants, they aren't smokers and they aren't professional exposed. From the total sample of children, two groups of 15 are made: children with respiratory symptoms and respiratory diseases exposed to environmental tobacco smoke and children with respiratory symptoms and respiratory diseases non exposed to environmental tobacco smoke. Cotinine was examined in urine of children. Samples morning's urine were collected from children and in the same day those have been read. «Rapid Signal COT Cassete», immunochromatographic test is used.

A total of 30 urine samples were analyzed: 6(20%) were positive with cotinine concentrations of more than 200ng/mL. Statistical significance of difference is established by Fischer test of exactly probability.

Results of cotinine detection in urine also have showed that urinary cotinine levels were significantly higher in the exposed group than the non exposed group

Key words: schoolchildren, urine cotinine, ETS

10. RESEARCH ON FOODS AND SUPPLEMENTS: USE OF NUTRITION AND HEALTH CLAIMS

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Objectives: On food and supplements there are nutrition and health claims, the wording is not in line with EU food legislation (EU Regulation 1927/2006 and Directive 432/2012), nor with the SRB legislation. In Serbia, the book of regulations on nutrition and health claims is still in the defining phase. Formulation of statements, which on the products are false and usually incorrect, can be misleading for consumers. This paper presents a study conducted on 2504 products, which are divided into nine groups: oils and margarines; bread and pastry; breakfast cereals; sweet confectionery, savory confectionery; non-alcoholic beverages, supplements, dairy products and dietary products.

Materials and methods: The research - filling in forms (list of ingredients, nutrition and health claims, nutrition charts) for each product taken from shelves of two hypermarkets in June-September 2013 in Belgrade and statistically analyzing the data.

Results: Of all products only on 23% of them there were nutrition claims, of that on 91% of them the claims were correctly used and on 9% they were incorrect. Most of the nutrition claims were found on supplements, up to 68%, and the least on the bread group 11%. The most accurate nutrition claims used, 97%, were on the non-alcoholic beverages group, and the worst on the bread group (up to 99.8% incorrect claims).
Health claims were located on only 8% of the products, of which 30% were correctly used. Most of the health claims were on the supplements, as much as 25%, and the least on the savory confectionery group (2%). The most correct health claims used, as much as 56%, were on the sweet confectionery group, and the least correct were on the bread group (100% with incorrect claims).
Conclusion: It is necessary to educate the producers, because on 42% of the products correct nutrition claims were found and the as much as 27% of correct health claims. It is also necessary to educate consumers, in order for them to identify false and incorrect claims. Food legislation (designated Ministry) should as soon as possible issue a book of regulations concerning nutrition and health claims.

Key Words: Nutrition claims, health claims, food labels, nutrition, declaration

11. WHEN LOW DOSE IS TOO HIGH - EMERGING CONTAMINANTS IN ENVIRONMENT AND HEALTH

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Emerging substances (EmS) are newly recognized pollutants widely used as pharmaceuticals, endocrine modulating compounds, biological metabolites, personal care and household products, agricultural chemicals, flame retardants, plasticizers, etc.

Although EmS have been detected at ppb, ppt and lower concentrations in wastewater, surface water and ultimately in drinking water, constant input into the environment makes EmS the pseudo-persistent pollutants even if their half-life is short. EmS have received great attention among the scientists and the public due to the possible negative effects of occurred low doses on human health and environment in general. The registered growing resistance of the vast bacteria groups, potential mutagenic, carcinogenic and toxic effects of EmS as well as adverse reproductive and developmental consequences of hormonally active EmS at low doses affect powerfully on the state of the environment and on the human health.

Based on the new evidences that EmS low doses have adverse effects on wildlife and moreover on human health, the traditional thinking in toxicology is not adequate to conclude consequences of present concentration levels of hormonally active EmS.

Acknowledgements: This research has been financially supported by the Ministry of Education, Science and Technological Development, Republic of Serbia (III46009) and NATO Science for Peace Programme (ESP.EAP.SFPP 984087).

Key words: emerging substances, endocrine disrupters, pharmaceuticals, aquatic environment, pseudo-persitence.

12. CONTROL OF WATER SUPPLY IN TERMS OF PROHIBITING THE USE OF POTABLE WATER FROM CENTRAL DISTRIBUTION NETWORK OF THE CITY OF UZICE

Olivera Janjić, Prosić V.

Public Health Institute Uzice

Process of water treatment in water system plant 'Petar Antonjevic' did not provide healthy and safe drinking water to population of Uzice in the period of December 2013 to February 2014 as well as in the period of July and August 2014. The presence of biological indicators is the cause of the deterioration of water quality. To reduce the risk to public health a number of preventive activities was conducted.

In accordance with legislation, in Public Health Institute Uzice physico-chemical and bacteriological water quality testing of water that was used in the sanitary-hygienic purposes, drinking water from cisterns and water from alternative sources was carried out. Sampling and treatment of samples was done by standard SRPS ISO 5667-1 and standard SRPS ISO 5667-2. There was bacteriological malfunction in 5.28% of the samples. Determination of total content of microcystin and microcystin LR (parameters of the indication) in 33 samples of drinking water from the distribution network showed their absence. Sanitary-hygienic monitoring of tanks for drinking water, indicates difficulties in maintaining bacteriological correctness in summer. It was found that most of the alternative sources (public fountains, springs, wells) are outside the control of water quality. A large part of those wells whose water is controlled does not meet the criteria of hygienic safety. In order to improve the quality of water supply it is necessary to implement a monitoring system for alternative water sources, to develop the care and regular maintenance of facilities and to develop a program to educate the population. During the period of difficult water supply there was no deterioration of the epidemiological situation and increase the number of diseases that are a result of using water for drinking.

Key words: water quality, alternative sources, water supply, Uzice

13. NUTRITIONAL STATUS OF CHILDREN AGED 15 YEARS IN TOPLICA DISTRICT

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Objectives: Obesity prevention is an international public health priority and there is growing evidence of the impact of overweight and obesity in children and adolescents on short-term and long-term functioning, health and well being. The aim of this study was to determine the anthropometric and nutritional status among children in Toplica district.

Materials and methods: The cross sectional study encompassed 775 children (409 boys and 366 girls) aged 15 years and it was conducted between 2003-2004. The body mass index (BMI) were calculated using the anthropometric measurements (body heights and body weights) measured by trained physicians or nurses.

Results: Overweight (BMI, 85th to 95th percentile) was observed in 10,02% of boys, and in 9,84% of girls, compared with 5,13-5,19% of obese children (BMI, >95th percentile). On the basic of standard deviation (SD) score, the prevalence of the overall overweight (SD score, 2 to 3 for BMI) among the examined children was 3,42% in boys and 1,91% in girls. The prevalence of the SD score >3 for BMI was 1,96% in boys and 3,28% in girls.

Conclusion: Anthropometric assessment still takes on great importance in the nutritional diagnosis of children. The effective and sustainable prevention of obesity among children and adolescents is possible and is a must in tuday's societies.

Key words: nutritional status, children

14. SMOKING AND HEALTH

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Public Health Institute Nis

Introduction : Smoking is one of the most common and the most infamous of harmful factors that lead to a large number of consequences in terms of occurrence of various diseases and conditions.

The World Health Organization ranked the smoking addiction, which makes the image all the more worrying because with nicotine, smokers also breathe about 4,000 other chemicals in cigarette smoke. Many of them are chemically active and cause profound and detrimental effects in the body.

Methods : Review of the literature available on research databases.

Results : World Health Organization estimates that 1.2 billion people worldwide use tobacco, of which 84% of smokers live in developing countries. According to the same source, tobacco causes death, with 6 million people a year, with the expectation that this figure to double in the next 20 years. If the growth in the number of smokers present rate, the number of smokers will be from today's 1.2 billion to climb to 1.7 billion by 2025. Every 6.5 seconds one person dies as a result of smoking.

Conclusion: Smoking leads to nicotine addiction, which is the least dangerous among addictions, but knowing all the risks to health which leads, not at all harmless. Because of pleasure which provides smoking cigarettes are much smaller than the hazards and risks that entails.

Quit smoking has long-term beneficial effect on the health of the individual. Smokers who have stopped smoking before they become 35 years of age have the same length of life as non-smokers.

Key words: smoking, health

15. VEGETABLE OILS AS A GOOD SOURCE OF VITAMIN E

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Objectives: Vegetable oils are characterised with high vitamin E content. [1] Depending on way of production and usage, that content can be preserved or diminished. On our market exists more and more versatile offer of vegetable oils with declared tocopherols content. By appropriate usage of this foodstuff, it is possible, to the significant extent, to satisfy vitamin E daily needs. [2]
The aim of this work was to determine tocopherols content in esculent vegetable sunflower and olive oils from our market before and after their thermal treatment, by using HPLC method.
Materials and methods: Esculent vegetable oils from retail, of various origin and way of production (14 sunflower and 4 olive oils, total of 16) were analysed before and after thermal treatment for 20 min. For an accurate and reliable determination of vitamin E content in foodstuffs of complex composition it is necessary to perform multiple sample purification, while for a determination in vegetable oil a liquid/liquid extraction is recommended after alkaline hydrolysis. [3] An n-hexan extraction was applied, extract vaporization and reconstitution in methanol using membrane filtration. Separation was performed by using RP-HPLC method with fluorescent detector with changeable wavelengths.

Results: A sunflower oil tocopherols content varies between 265,6 do 920,7 mg/kg. All samples except one fullfil declaration requirement. A difference in vitamin E content in olive oil is also significant and varies between 194,7 do 454,1 mg/kg. A thermal treatment applied diminishes the tocopherols content 41,7% in sunflower oil and 27,8% in olive oil on average.
Conclusion: Tocopherols content determined in oils before thermal treatment corresponded to the declared content, with significant differences depending on origin and declared way of production. Thermal sample treatment affected significantly reduction of vitamin E content.

Key words: vegetable oils, vitamin E, thermal treatment

16. INPORTANCE OF QALITY CONTROL OF MILK AND OTHER MILK PRODUCTS (2010-2014)

Biljana Đorđević, D.Nikolić, N. Mladenović

Public Health Institute Nis

Introducing new Food Law, Public health institutes do not systematically control food.

In period 2010 - august 2014. 734 samples from group of milk and milk products .Total number of defective samples was 53 (7.1%). Results were interpreted by Regulations for milk and milk product and starter cultures and Regulations for declaration.
From 310 samples of cheeses 6.5% (20) was defective. Defectiveness, caused with lower fat and/or lower dry matter was occurred in 50.0% of samples, 10.0% samples contained more fat then it was declared and 15.0% of samples were not properly declared.
The remaining samples (424) from group milk and milk products were defective in 8.3% (35 samples) of which, 48.6% were with lower fat content, 22.9% with lower dry matter without fat (or proteins), 8.6% samples contained more fat then it was declared and 17.1% of defective samples was not properly declared.
Such results represents less quality, changed biological value, with intention to yield the cheapest product or applied poor technology. Poor declaration indicates lack of information or unawareness of new Regulations for milk and milk product and starter cultures introduced from 2010.
In order to protect consumers it is recommended further systematic control of producers.

Key words: milk products, cheese, quality, defectiveness,

17. DETERMINATION OF TOTAL LEAD IN MAKEUP PRODUCTS

Jelena Videnović, S. Veličković

Public Health Institute Nis

Introduction: Lead is natural environment element and all of us on a daily basis is exposed to small amounts of lead in food, water and air.

Accumulation of lead in the body can be the cause of phenomena such as lower IQ, behavioral and growth problems, vision and kidney damage, reproductive disorders, high blood pressure ....

Slight traces of lead due in make up products (lipstick, lip gloss ...) throughout the production process from ingredients such as dyes and pigments.

Goal: Determination of total lead in make up products from market by random selection and evaluation of potential intake of lead as a toxic element by these products.

Results: Sample preparation was performed by microwave digestion and determination of lead using GFAAS.

The lead content in the ten analyzed samples ranged from 0.39 mg / kg to 6.39 mg / kg.

Conclusion: Although the lead content in these products is high, it is believed that there is no security risk because of locally application, limited absorption and low ingestion of makeup products.

We can’t talk about safe exposure to this toxic metal that has a cumulative effect in the body.

Key words: lipstick, lead, make up products

18. LEVELS OF COMMUNAL NOISE IN NIGHT INTERVAL IN SUTOMORE DURING SUMMER SEASON MONTHS

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Introduction: Adequate sleep is a necessary prerequisite for the normal functioning of the human organism. Communal noise as a stressor can exert various adverse health effects, especially on the quality and duration of sleep.

Objective: To determine the level of night noise pollution in the residential area of coastal local community Sutomore during the summer season months.

Material and methodology: The levels of noise pollution were measured within the reference interval for the night. Measurement were carried out in the period from 20.07-18.08.2013, in a measuring intervals of 15 minutes. A total of 35 measurements was performed according to the standard methodology and relevant legislation.

Results: The dominant source of noise pollution are the hospitality facilities (restaurants, clubs, etc.), emitting too loud music. In all measurement intervals noise levels enormously exceeds the levels stipulated by law.

Conclusion: In order to reduce noise levels in the residential area of Sutomore, it is necessary to take protective measures. This measures can be organized through increased surveillance of the communal police, banning of limiting the use of electro-acoustic devices, financial penalties and other measures in order to allow adequate rest and sleep for residents and tourists.

Key words: Communal noise, summer season, residential area, sleep deprivation

19. SALT CONTENT IN PREPARED FOOD FROM RESTAURANTS AND THE RISK OF NCDS

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Introduction: Excessive salt intake from food is directly related to the occurrence of Noncommunicable diseases (NCDs), which are the leading cause of mortality worldwide. According to literature, the highest salt intake from food, 75 % of total intake originates from the so-called hidden sources – food we don't prepare at home. About 15% of the salt we are adding ourselves, while only 5% of salt intake comes from natural sources.

Objective: To determine salt intake based on the average restaurant meal in Montenegro.

Material and methodology: Salt content is analyzed in prepared dishes sampled from restaurants within the Health and Sanitary Inspection Programme. Mohr Volumetric Method was used to determine the salt content in food.

Results: The analysis included 94 samples divided into 9 groups. The lowest average salt content was detected in salads, while the highest was detected in meat and pasta dishes. Taking into account the food samples and daily intake, it can be estimated that the average lunch in restaurants contains more than 9g of salt.

Conclusion: To reduce daily salt intake in accordance with WHO recommendations, it is necessary to establish better cooperation with food business operators in order to provide food with low or decreased salt content. In order to achieve a reduction in morbidity and mortality from NCDs, it is necessary to conduct training at all levels, and to provide consumers with choice in decision making.

Key words: salt content, Noncommunicable diseases, daily intake, prepared dishes.

20. DETERMINATION OF HEAVY METALS IN PM 10

Biljana Ljubenović, B. Petrović

Public Health Institute Nis

The atmosphere is releasing millions of tons of various pollutants, gases, vapors, particles from diferent sources (households, power and industrial plants, metallurgy, transport), and they emit a large amount of various air pollutants. Suspended particles are a complex mixture of organic and inorganic substances whose composition depends on the source of emissions, and the length of survival in the air depends on the size, shape and density of particles. According to the Regulation on the conditions and requirements for monitoring air quality (Official Gazette of RS No. 11 / 2010.75 / 2010 and 63/13) the level of air pollution is monitored by measuring the concentration of suspended particulate matter (PM 10 and PM 2.5), and further analysis suspended particles PM10 heavy metals lead, arsenic, cadmium and nickel. Sampling procedure includes the preparation, retrieval, storage, transport to the laboratory, where it is the physical and chemical testing of samples. Results of measuring the concentration of pollutants are compared with the prescribed limit, tolerance and target values . The measurements were carried out with twenty-four hour sampling of ten days a month, from January 2013 to December 2013, the measuring spot Public Health Institute Nis, and determined the concentrations of PM10, lead, arsenic, cadmium and nickel. The threshold value for the sampling of 24 h for PM10 fraction of suspended particulate matter is 50 mg / m 3, while the tolerance value for the same parameter of 75 mg / m3. For the same period the fairness and tolerance for lead at 1 mg / m3. And if the first three months 2013 concentration fractions PM10, crossed the border and in three cases and tolerant values, concentrations of heavy metals remained far below the threshold and tolerance values.

Keywords: air pollution, particulate matter, heavy metals

21. SANITARY-HYGIENIC CONDITIONS IN THE CATERING FACILITIES IN THE ZLATIBOR DISTRICT

Violeta Prošić, Janjić O.

Public Health Institute Užice

The monitoring of sanitary- hygienic conditions in the catering facilities is of great significance since it allows definition and improvement of the activities which refer to maintaining sanitary and hygienic conditions in these objects for the sake of achieving high level of consumers' health and interest protection.

Objective: Determination of potential contamination sources based on the sanitary and hygienic parameters' analysis, based on which the professional help with the correction of sanitary-hygienic conditions in these object will be provided.

Material and Methodology: The research included the sanitary-hygienic conditions of kitchen block by the local inspection method, as well as the sanitary and hygienic condition of the kitchen block by the swab analysis of the dishes, utensils, work surfaces and hands of staff who manipulates food during preparation for the catering facility Zlatibor District in the period 2011. to 2013. The tests were performed using standard bacteriological methods and the accuracy score was performed on the basis of existing legislation.

Results: In this period 2621 swab samples of the dishes, utensils, work surfaces and 1040 swab samples hands of staff employed were analyzed in the kitchen block of the catering facilities. 98 swab samples (3,74%) of dishes, utensils, work surfaces and 47 (4,52%) swab samples hands of staff employed the kitchen block does not satisfy the standards provided by the applicable legislation.

Conclusion: The regular monthly controls and advices have given a positive improvement in the sanitary-hygienic conditions Zlatibor District catering facilities.

Keywords: catering facilities, Zlatibor District

22. THE DISORDER OF UZICE WATER SUPPLY SYSTEM IN THE PERIOD OF DECEMBER 2013-AUGUST 2014

Violeta Prošić, Janjić O.

Public Health Institute Uzice

The disorder of Uzice water supply system has occurred due to appearance of cyanobacteria at both the source and the water supply system, which can have an adverse effect on health of drinking water consumers'.

The aim of this paper was to present the results of biological raw water research and modified drinking water in the period of December 2013 – August 2014.

Material and methodology: In this period, sampling of 90 raw water samples and 637 treated water samples took place for the sake of biological analysis. Sampling and treatment of samples was done according to the standards ISO 5667-1 and ISO 5667-2. In all water samples was performed identification and quantification of the number of cyanobacteria cells, according to method SRPS EN 15204:2008 Water quality - The manual for Phytoplankton count using invert microscopy, such as determination of total microcystine content and the LR microcystine in the 34st drinking water sample from the distributive network. Januray 2014. at the Insitution of Berlin, the microcystine analysis took place and there was no evidence of thy presence in the drinking water.

The **results** of biological research has shown that the water supplied to consumers by the water supply systen of Užice contains Planktothrix rubscens, but not cyanotoxins.

The conclusion is that the monitoring of cyanobacteria cells in the water supply systems in the distribution network , such as introducing new water processing technologies is necessary due to potential health risk.

Keywords: water supply system, cyanobacteria, Uzice

23. PREVALENCE OF *PSEUDOMONAS AERUGINOSA* IN WATER FOR SWIMMING AND RECREATION AND INDOOR AND OUTDOOR SWIMMING POOLS

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City Public Health Institute Belgrade

Objectives: To determine the frequency of p.aeruginosa positive finding in water samples of swimming pools on the territory of Belgrade.

Materials and methods: Our study included 3837 samples of water from public and hotel pools analyzed in the laboratory of GZZJZ during period January 2009 to December 2013. Parameters included are pool type (indoor/outdoor), water temperature (^{0}C) and free residual chlorine concentration (RCl_2^-mg/l) measured at site, and bacteriological p.aeruginosa positive finding.

Results: We have registered 165(4.30%) P.aeruginosa positive samples, of which 64(5.96%) in outdoor pool water samples (n=1080) and 101(3.66%) in indoor pools water samples (n=2757). In P.a. negative samples from indoor pools average water temperature was T=27,5^{0}C(MEDIAN 27,3^{0}C) and average concentration of RCl_2^-=0.44mg/l(MEDIAN 0.50mg/l). In P.a. positive samples from indoor pools average water temperature was T=28,9^{0}C(MEDIAN 28,3^{0}C) and average concentration of RCl_2^-=0.30mg/l(MEDIAN 0.30mg/l). In P.a. negative samples from outdoor pools average water temperature was T=25,2^{0}C(MEDIAN 25,6^{0}C) and average concentration of RCl_2^-=0.42mg/l(MEDIAN 0.40mg/l). In P.a. positive samples from outdoor pools average water temperature was T=25,2^{0}C(MEDIAN 26,2^{0}C) and average concentration of RCl_2^-=0.42mg/l(MEDIAN 0.40mg/l).

Conclusion: P.aeruginosa positive finding in swimming water is more frequently registered in outdoor pools, as well as in indoor pools with higher water temperature and lower free residual chlorine concentration.

Keywords: P.aeruginosa, water, swimming, indoor/outdoor pool

24. DIETECTIS SUPPLEMENT IN MALE INFERTILITY COMPLEMENTARY TREATMENT

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Infertility represents the lack of pregnancy after a year of unprotected sexual intercourses. The spread of male infertility, according to some authors, varies from 25% to 40% out of entirely registered infertility. Male infertility has many causes which can be divided into testicular, pre-testicular and post-testicular. The number and variety of the causes which lead to the decrease or lack of male fertilizing potential demand different treatment approaches. The easiest forms of therapy are the ones which include supplemented diet, and the most radical ones are from the domain of surgery. Scientific literature describes the following as the most commonly used: vitamin-mineral preparations, fruits and extracts of particular plants and essential amino-acids where there is a wide spread of registered levels of their success. **The goal of our work** is to determine to which extent the dietetic supplements are suitable for male infertility treatment. **In methodology**, we applied semen analysis of men who have been registered with the decreased fertilization potential according to the strict Kruger's criteria, at the beginning of the therapy and 3 months afterwards. The work comprised 100 systematically chosen examinees and the changes of their parameters were followed: the number of spermatozoids in 1 ml of ejaculation, changes in the spermatozoids progressive movement (active and slow movement) as well as the changes in the percentage of morphologically normal spermatozoids. The patients were recommended, besides taking Proksid, to quit smoking, increase physical activity and use various available supplements. **Results:**with regard to the number of spermatozoids in 1 ml. of ejaculation, it is determined that their value is considerably increased from the moment before taking supplements $p < 0.001$ ($\bar{X}_1 = 44.78$, $SD_1 = 40.28$) and after taking the supplements ($\bar{X}_2 = 58.73$, $SD_2 = 46.75$), $t(99) = -5.265$, $p < 0.001$. The T-test of the samples estimated the influence of the supplements on the percentage of progresivelly mobile spermatozoids in the examinees' ejacualtion. Statisticly significant value increase is determinedfrom the moment before taking supplements $p < 0.001$ ($\bar{X}_1 = 42.13$, $SD_1 = 27.84$) to the moment after taking the supplements ($\bar{X}_2 = 56.49$, $SD_2 = 25.88$), $t(99) = -6.587$, $p < 0.001$. Statistically significant increase in the percentage of actively mobile spermatozoids is determined form the moment before taking supplements on the level $p < 0.001$ ($\bar{X}_1 = 12.53$, $SD_1 = 14.04$) to the moment after the supplement therapy ($\bar{X}_2 = 21.55$, $SD_2 = 18.03$), $t(99) = -7.297$, $p < 0.001$. Also, we determined the statistically significant increase in the value of slowly mobile spermatozoids (B mobility) from the moment before taking the supplements on the level $p < 0.05$ ($\bar{X}_1 = 29.70$, $SD_1 = 20.07$) to the moment after the supplement therapy ($\bar{X}_2 = 34.90$, $SD_2 = 17.29$), $t(99) = -2.584$, $p = 0.011$. Also, the T-test of the paired samples estimated the influence on the normal spermatozid forms percentage in the examinees' ejaculations. Stiatistically significant value increase is determined form the moment before taking suppolements on the level $p < 0.001$ ($\bar{X}_1 = 9.84$, $SD_1 = 6.64$) to the moment after supplement therapy ($\bar{X}_2 = 12.53$, $SD_2 = 6.40$), $t(99) = -7.123$, $p < 0.001$.

Conclusion: Besides the fact thatour studies determined the high level of positive correlation between taking supplements and semen quality improvement, we recommend that the examination should be continued with the more subtle methods in this field in order to complete the knowledge, application and to improve the efficiency of dietetic supplements in male infertility treatment.

Key words: dietetic supplements, male

25. MICROBIOLOGICAL INDICATORS OF WATER POLLUTION BY MUNICIPAL SOLID WASTE LANDFILL

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The research was conducted within the project TR 37016 of Ministry of Education, Science and Technological Development of Republic of Serbia

Introduction. Inadequate and unplanned municipal solid waste (MSW) landfills pose a huge problem and long-lasting risk for the environment and humans as well. Inadequate positioning and organization of MSW landfills could be a source of additional problems for environmental pollution. These problems are specially expressed when the landfills exercise direct influence on the groundwater pollution.

Objectives. Determination of bacteriological pollution disposition from solid waste landfills into the environment.

Materials and Methods. Water sampling was carried out in the surrounding of the MSW landfill in which it achieves direct contact between landfill content and groundwaters. Taking into account position of the MSW landfill, surface water, groundwater as well as landfill's wastewater were analyzed. Samples were analyzed at microbiological laboratory of the Public Health Institute in Kosovska Mitrovica.

Results. Total number of bacteria per ml in surface water sample – before landfill was 800, first piezometer – before landill – was 60 000. In landfill wastewater sample we found 160 000 (with the presence of *Pseudomonas aeruginosa*) while in second piezometer – after landfill and surface water also after landfill we found same number of 100 000.

Conclusions. MSW landfills represent the large source of groundwater bacterial contamination. Structure of groundwater and surface water pollution influenced by landfill had a significant changes, both in their number and in content.

Keywords: Municipal Landfills, Bacterial Contamination, Water.

26. PARTICIPATION IN LGC PT SCHEME- METALS IN WASTE WATER AQ 3506

Biljana Ljubenović,J.Videnović, I.Kamenović, S.Veličković

Public Health Institute Nis

Metals are cations that are best suited for research and analysis. Purchase of the first atomic-absorption-spectrophotometer (AAS), 1988, Laboratory for Sanitary Chemistry, Public Health Institute, Niš, was included in the first five laboratories which were able to be next to the analysis of metals in food, water, air pollution and general purpose , conducts scientific research, as a logical sequence of training and testing of daily work followed the different interlaboratory comparisons both local and global character.

Today, interlaboratory comparisons are mandatory requirement that each laboratory must meet in order to have the authority to operate. 2014, we participated in Aquacheck PT Schema AQ3506, the matrix waste water. The subject of the analysis are ten metals in different concentration ranges.

Results for the nine metals were within the permissible values as follows: As, Cr, Cu, Fe, Pb, Mn, Hg, Ni and Zn. Z-score for Cd, was outside acceptability range.

Key words: inter-laboratory analysis, metals

27. LEAD CONTENT IN PERSONAL CARE PRODUCTS AND BODY AND FACE COSMETICS

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The purpose of this paper is to determine lead concentration in personal care products and body and face cosmetics (group A and B), an to interpret the results in accordance with the Regulations on conditions concerning health and safety of personal care products and cosmetics that can be put on the market.

The accredited laboratory for sanitary chemistry (ISO 17025) of the Public Health Institute Nis, in the period from June 2008 to June 2009, using atomic spectrophotometry method, determined the content of lead in 131 personal care products and body and face cosmetics (group A and B).

The lead content for mouth and dental care products was (n=7) from 0.2-1.30 mg/kg, for products for beatification and coloring of lips (n=16) from <0.02-1.32 mg/kg, for products for beautification and coloring of eyes (n=9) from 0.11-5.1 mg/kg, for skin care and protection products (n=57) <0.02-1.32 mg/kg, for face and body coloring n=9)- 0.002-2.68 mg/kg and for deodorants (n=33) <0.02-1.32 mg/kg.

The Regulations stipulates the maximum lead concentrations that can be released from mouth and dental care products (10 mg/kg), products for beatification and coloring of lips (20mg/kg) and products for beautification and coloring of eyes and other product that stay on skin for longer period up to 30 mg/kg.

The levels of lead in all analyzed samples were significantly lower than those stipulated by the Regulations, and there is no health risk for lead exposure by means of personal care products and body and face cosmetics.

Key words: lead, personal care products, face and body cosmetics

28. MATHEMATICAL MODELS FOR DETERMINING THE ZONE OF AIR POLLUTION AND DISTRIBUTION OF BLOOD LEAD LEVELS

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The research was conducted within the project TR 37016 of Ministry of Education, Science and Technological Development of Republic of Serbia

Introduction. In the areas where air pollution by heavy metals is present, distribution of pollution is usually not uniform. Mathematical models could provide an significant assistance in quality and speed of obtaining results of distribution of air pollution.

Objective. Determining the trends of capillary blood lead levels (c*BLL*) among workers in the zones with different levels of air pollution, established by a mathematical model of distribution.

Materials and Methods. Using a mathematical model provided in the WRPLOT ViewTM 7.0.0. software, we determined air-pollution spreading of the town of Leposavić. In two groups, we sort the 35 subjects. According to the mathematical model, the first subjects group was their work activities performed in the zone of contamination, while the second subjects group their activities was performed outside of the zone of contamination. In both groups we found that certain c*BLL*.

Results. The mean c*BLL* value of all subjects was 15,1 ± 14,6 µg/dl. The mean c*BLL* value of workers from the second group was 5,9 ± 4,7 µg/dl, while in workers of the first group it was 23,4 ± 15.6 µg/dl, which is statistically significant difference ($p<0,001$). Workers of the first group had significantly higher *vBLL* values.

Conclusions. c*BLL* values of workers employed in zones with higher levels of air pollution, defined by a mathematical model, were higher. The level of lead in biological material follows environment pollution levels, previously defined by mathematical model.

Keywords: Air Pollution, Matematical Models, Blood Lead Level.

29. CHRONIC EXPOSURE TO CADMIUM IN METAL INDUSTRY

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Objectives: Chronic poisoning professionally can occur after long-term exposure to cadmium by inhalation or orally, which has the task to study its toxic effects. Given that exposure to low levels of cadmium in biological materials is an important indicator of the toxicological risk, performed the statistical analysis of the association of age and length of service and cadmium concentrations.

Materials and methods: The applied analytical method type of retrospective epidemiological cohort study covering the period of ten years. We used data from the annual reports of social services and medical statistics, data from medical records and the specific primary health care professional is employed and the Institute for Health Workers and the Public Health Institute in Nis. Using atomic absorption spectrometry, the analysis of the concentration of cadmium in biological material. Statistical analysis and presentation of the results was performed software packages Excel, Matlab, SPSS19.0.

Results: The level of cadmium in blood and urine of exposed groups during the study period was positively correlated with age ($r=0,722$, $p<0,01$ i $r=0,656$, $p<0,01$, respectively). Determined by the high positive correlation between the concentration of cadmium in blood and urine and the exposed length of service in exposed subjects during the time of study, ($r=0,806$, $p<0,01$ i $r=0,705$, $p<0,01$, respectively).

Conclusion: These data confirm the association between occupational exposure to cadmium as well as the age and length of service exposed and pointing to a response to the effects of harmful effects. A retrospective cohort epidemiological study showed that the systematic effects of cadmium exposure results in an increase of its concentration in biological material, confirming the hypothesis of high toxicological risk.

Key words: cadmium, chronic exposure, toxicological risk.

SESSION: SOCIAL MEDICINE

TOPIC: INDICATORS OF HEALTH STATUS AND FUNCTIONING OF THE HEALTH SYSTEM

INVITED LECTURES

1. PERFORMANCE EVALUATION OF REGIONAL HEALTH CARE SYSTEMS: AN ITALIAN EXPERIENCE

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Abstract

This paper aims to develop a performance evaluation tool, that allows to analyse some dimensions of National Health Service performance. The considered dimensions are: Efficiency, Appropriateness, Effectiveness, Patient centeredness, satisfaction and accessibility.

As performance is a challenging issue in terms of theoretical construct and measurement, a total of 26 indicators, as a proxy of the performance dimensions chosen, have been selected, using a Delphi approach, from 103 indicators taken from the Italian New Healthcare Information System (NSIS). For each dimension, composite indicators have been calculated, as synthesis of single indicators, by geometrical mean. These composite indicators allow us to make Regional rankings, for each dimension, and produce evaluations on the trade-off between some of the different dimensions considered.

The analysis, carried out within the Italian Regionally based National Health Service, pointed out the gap between the Northern and the Southern Regions, although some interesting exceptions are evident. Even more interesting is the comparison between efficiency and each of the other analysed dimensions. It highlights that the pressure on efficiency has often undesirable consequences on outcome, both in terms of health outcomes and appropriateness, accessibility and satisfaction.

Keywords: Quality Indicators, Health Care, Italy, National Health Service, Quality

Introduction

Over the past decade, health care expenditure has risen in all developed countries, questioning the economic sustainability of health systems, especially, those on public financing. The decision makers should find a way to ensure a health system that optimizes the use of resources and provides universal coverage [1, 2].

Italy's health care system has experienced important transformation during the last thirty years. Since 1978, Italy's health care system is a regionally based National Health Service that provides universal coverage free of charge at the point of service throughout the country. The system is organized at three levels. The definition of the essential level of care, resource allocation, and policy and planning frameworks are the responsibility of the national government through the Ministry of Health. The central government retains responsibility for other functions as approving the National Health Plan, allocating funding and defining clinical and accreditation guidelines.

The regional level is responsible for ensuring the delivery of a benefit package through – the local level - a network of population-based health management organizations (Local Health Trusts) and public and private accredited hospitals [3].

The period 1997–2001 witnessed a series of radical and innovative changes in state institutions and health care regulation. The 2001 constitutional reform (the so-called Reform of the Chapter V of the National Constitution) substantially strengthened the evolving system of 'fiscal federalism'. Now the organisation of health care falls into the remit of the Regions and autonomous provinces, which are liable for any deficit incurred.

Central government also has a constitutional obligation to guarantee access to health care in each of the regions, to reduce health inequalities and to ensure that the health system operates efficiently and transparently, with an increasingly important role played by the Government-Regions Committee through agreements known as "Health Pacts" (*Patti per la Salute*), which are adopted every three years.

However, these arrangements are not fully implemented; a detailed list of services guaranteed by the National Health Service has never been defined in important areas such as hospital care and regional health expenditures have not always been controlled. In addition, in the 2001–2010 period, regions generated over 38 billion Euros of cumulative deficit, approximately 4.2% of the total expenditure over the period. This deficit has been highly concentrated in the Lazio, Campania and Sicily - in the Central-Southern Italy - which together account for 69% of the total cumulative deficit [4]. Thus, in Italy, the growing interest in performance evaluation is due not only to the economic sustainability of the system, but also to the effects of political and organizational changes, fiscal federalism and changes in standard cost observed over the past 20 years.

In the meantime, financial deficits among Regions increased. As a significant reduction of indicators of quality, continuity and outcomes of the health care has not been found, short (a) and long (b) term impact effects on health were reported: a) raise of mental health related problems, measured in terms of number of suicides, depression and substance misuse lower access to preventive services, decreasing in healthy habits; b) almost two hundred deaths a year due to the increase of unemployment rate [4, 5].

Therefore, it is necessary to implement new technical tools to support politicians, public administrators and citizens in the evaluations of the correspondence between the health care needs in each Region and how they are able to combine fairness and efficiency.

Methods

In order to perform an extensive literature review, we first updated a research aimed at defining the most frequent dimensions to evaluate the performance of national healthcare systems [6].

The dimensions of the performance are composed by many sub-dimensions or components (for example, appropriateness include clinical and organizational appropriateness [6, 7]) and all of the dimensions represent "hidden dimensions", theoretical constructs that cannot be measured directly.

The performance dimensions, defined according to the literature review, were matched with the available indicators from a database, consisting of a list of 103 indicators of the Italian New Healthcare Information System (NSIS).

To: a) select indicators referred to the performance dimensions chosen, according to validity, responsiveness, interpretability, feasibility and reliability at regional level; and b) identify and compare the different methods to yield composite indicators useful to describe and evaluate the healthcare performance among the 21 Italian Regions and Autonomous Provinces [8, 9], we applied the Delphi technique, as a structured process using a series of questionnaires or 'rounds' to gather information, held until group consensus is reached.

In addition, we searched to identify synthesis methods to build up composite indicators useful to evaluate healthcare systems performance. The working group was composed of 3 health economists, 5 public health doctors and 1 statisticians. The synthesis of the indicators has been performed by using geometric means of standardised indicators (z-score). This technique is likely to guarantee better than others the composition of indicators referred to not replaceable components. Every indicator has the same weight in the construction of the performance composites indicators.

Results

We defined the main dimensions of performance, as follows:

- *Effectiveness/improvement of health outcomes*: it is the capability of services - produced by NHS and dispensed to the population – to lead to the expected health results. Efficacy, as a dimension of performance, is related to those health outcomes strictly attributable to the health system activity [9]. It includes the dimensions of effectiveness, safety, and competence;
- *Appropriateness:* it is defined as the assessment of medical acts in relation to costs, resources available and desirable results. Appropriateness should be clinical or organizational. Clinical appropriateness consists of the assessment of specific interventions to evaluate whether the expected benefits exceed adverse effects. The size of the performance evaluated is whether health care delivered is adequate to clinical needs, compared to current scientific knowledge. Organizational appropriateness is related to the setting in which care is provided, furthermore to the operational efficiency. The size of the performance evaluated is the appropriateness of the setting, and setting is a proxy measure of the resources used to provide care [10].
- *Patient centeredness*: This is achieved when health care establishes "a partnership among practitioners, patients, and their families (when appropriate) to ensure that decisions respect patients' wants, needs, and preferences and that patients have the education and support they need to make decisions and participate in their own care" [11]. It shows how systems respond to people's expectations with regard to how they are treated. Satisfaction evaluation tries to capture the level of satisfaction or dissatisfaction of citizens toward the health care system [12]. In a universal shaped health care system accessibility can be defined as the ease to access the guaranteed health services for those who need them. Access can be physical, financial or psychological and requires that services are available a

priori [13]. Accessibility evaluation allows us to evaluate the ability of the system to organize properly the offer of services, with regard to the ability of users to obtain treatment at the right place and at the right time, independently of income level and geographical location, in sufficient quantity and at a reasonable cost.

- *Efficiency*: it is defined as the ability of healthcare systems or organizations to maximize outcome for a given level of inputs, or alternately, to minimize input for a given amount of outcome [14, 15]. It is divided into allocative efficiency (microeconomic and macroeconomic) and technical efficiency, which refers to the physical relation between resources (capital and labour) and health outcome [16].

After the Delphi approach, the complete list of indicators was defined as follows:

Effectiveness

- Life expectancy at birth – Male
- Life expectancy at birth – Female
- Infant mortality rates (Deaths per 1 000 live births) – Male
- Infant mortality rates (Deaths per 1 000 live births) – Female
- Influenza vaccination coverage (per 100 residents)
- Rates of hospital discharges potentially avoidable for Chronic Obstructive Pulmonary Disease (COPD) and for heart failure without cardiac procedures (per 10,000 residents)
- Rate of hospital discharges potentially avoidable for long-term complications of diabetes mellitus (per 10,000 residents)
- Life expectancy without limitations at 65 – Male
- Life expectancy without limitations at 65 – Female
- Standardized rate of avoidable mortality for health services (0-74 years per 100,000 residents)

Appropriateness

- Proportion of patients with a hip fracture who have underwent surgery within 2 days
- Percentage of cesarean
- Proportion of birth occurred in hospitals performing more than 500 births per year
- (Territorial) Consumption of antibiotic drugs (DDD/1,000 inhabitants die) at the expense of the NHS
- Percentage of laparoscopic cholecystectomy on the total of the cholecystectomy
- Percentage of transurethral prostatectomyon total prostatectomies
- Rate of hospitalization for hysterectomy (per 10,000 residents women)
- Hospitalization rate under the ordinary scheme for DRG inappropriate (per 1,000 residents)

Patient centeredness

- Attractiveness Index hospital (immigration and emigration)
- Percentage of the private expenditure on the total health care expenditure

- Percentage of people very or fairly satisfied of the medical care received during the last hospitalization
- Percentage of people very or fairly satisfied of the nursing care received during the last hospitalization
- Percentage of people very or fairly satisfied of the food received during the last hospitalization
- Percentage of people very or fairly satisfied of the toilets used during the last hospitalization
- Rate of eligible elderly in integrated homecare assistance (for 10,000 elderly residents)

Efficiency

- Results per capita (sum of the costs, revenues and balances of regional mobility)

The results of performance evaluation highlight a gap between North and South, although with some interesting exceptions [4, 17]. The most virtuous and efficient Regions are those of the North and of the Centre of Italy, but with some exceptions. The best in the management of budgets are Valle d'Aosta, the autonomous province of Bolzano, Emilia-Romagna, Umbria and Abruzzo. On the other end of the spectrum Liguria, Lazio, Marche and Piemonte are characterized by low or middle-low efficiency levels.

The Regions with the highest levels of appropriateness are predominantly those of the North, Valle d'Aosta, Veneto, Friuli-Venezia-Giulia, Liguria and Marche. Emilia-Romagna, Umbria and Lazio present a middle-low appropriateness level. The last of the ranking are the Regions in the South.

The most effective Regions are Piemonte, Valle d'Aosta, the autonomous province of Trento, Liguria and Toscana. The other Regions in the Centre and in the North and Basilicata show a middle-high effectiveness level. At the end of the ranking the Regions of the South and the Autonomous Province of Bolzano, Lombardia and Friuli Venezia Giulia can be found.

The Regions with the highest level of satisfaction and accessibility are the Autonomous province of Bolzano, Veneto, Friuli-Venezia-Giulia, Emilia-Romagna and Marche. Sicilia, Calabria, Puglia, Campania and Umbria are at the lowest part of the ranking. Sardegna reveals a middle-high satisfaction and accessibility level. Piemonte, Valle d'Aosta and Toscana show middle-low accessibility and satisfaction level.

Even more interesting is the comparison between efficiency and each of the other analysed dimensions. It shows that the pressure on efficiency has often undesirable consequences on outcome, both in terms of health outcomes and appropriateness, accessibility and satisfaction. **Figure 1** shows the comparison between efficiency and effectiveness.

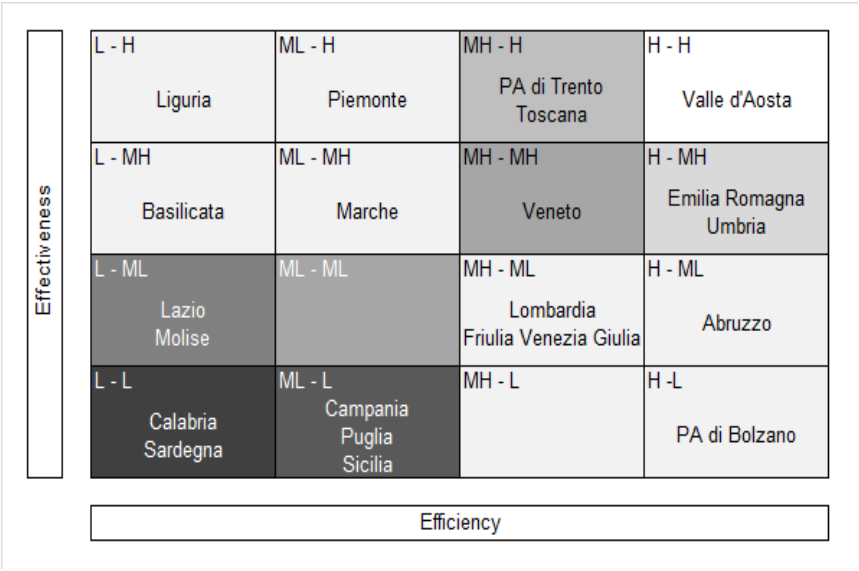

Figure 1: Comparison between efficiency and effectiveness

The autonomous Province of Bolzano and Abruzzo reveal on one hand positive budget, on the other hand low or middle-low effective level: it's the example of a good expenditure management versus poor results in terms of health. On the other side Regions, like Liguria and Basilicata with a low efficient level, show middle-high effective level. Valle d'Aosta is an example of excellence: it's able to combine high efficiency and effective levels. Calabria and Sardegna show negative results both on the efficiency and effectiveness sides.

The comparison between the dimensions efficiency and satisfaction and accessibility (**Figure 2**) is interesting too. It highlights Umbria as the most virtuous on the side of health care spending, but it provides a low level of accessibility and satisfaction. Instead Marche, Liguria, Molise and Sardegna disclose low or middle-low efficiency level and middle-high level on the side of accessibility and satisfaction.

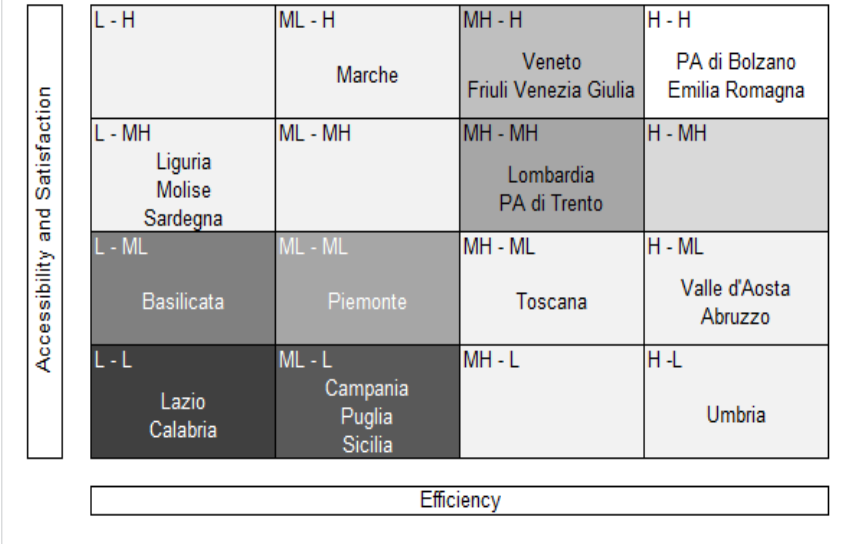

Figure 2: Comparison between efficiency and accessibility and patient satisfaction

The comparison between efficiency and appropriateness (**Figure 3**) reveal that only six Regions show contrasting levels of efficiency and appropriateness: Liguria, Marche and Piemonte reveal middle-low level of efficiency and middle-high appropriateness level; therefore Emilia Romagna, Umbria and Abruzzo show a middle-high efficiency level and a

middle-low appropriateness level. The other Regions stand on diagonal, that's to say there's concordance between the two dimensions. These results fit with the assumption that efficiency and (organizational) appropriateness can be strictly related: a good organization should promote a good expenditure control. It should be the same referring to clinic appropriateness, if it's able to avoid the lengthening of care paths because of ineffective interventions.

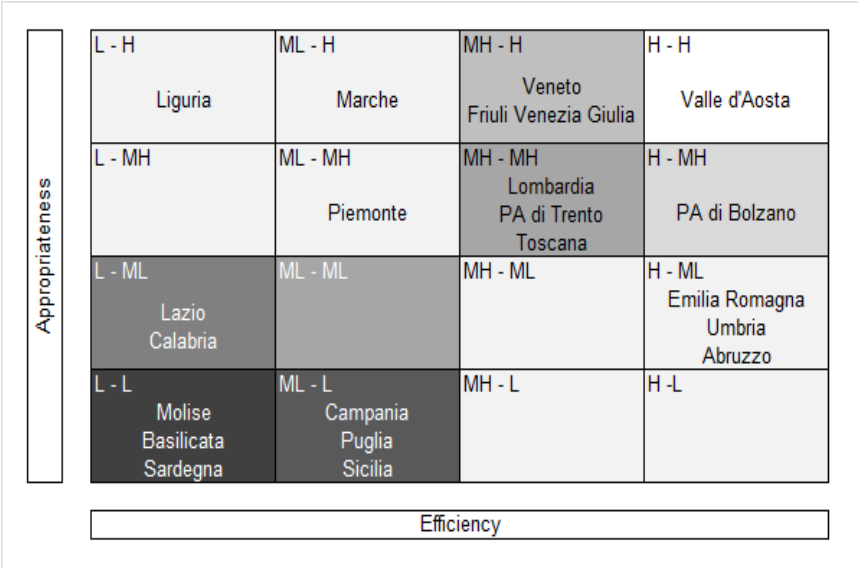

Figure 3: Comparison between efficiency and appropriateness

Discussion

We implemented a performance evaluation tool, suitable for the Italian healthcare regional context, so to apply a composite indicator for each dimension of performance.

Since 2001, a series of radical and innovative changes in state institutions and health care regulation have been taking place in Italy: political devolution of health care powers to the regions is creating the need for a new regulatory framework that radically transforms the institutional rules of governance and simultaneously enables state authorities to adequately perform a new control role [4].

Though the guiding values of the reform process are subordinated, financial responsibility of all levels of government, fairness and the correspondence between standard needs and financing of guaranteed essential levels of care (the so-called LEA, *Livelli Essenziali di Assistenza*) and main functions, the 19 Italian Regions and 2 Autonomous Provinces have exercised their autonomy very differently, with the Northern Regions being more successful in establishing effective structures of health care delivery, management and monitoring, if compared with the Southern Regions.

Less successful results come from other Regions, mainly but not only in the South, where centres with high standards of care, often spontaneously started and developed, are exceptions in a regional environment where poor vision, mismanagement and in some cases corruption have seriously affected the capacity of these Regions to offer a complete and appropriate set of care to their citizens [17].

Regional variation in health care reflects differences of contextual, political, economic and cultural, factors as well as differences between the Regional health systems. In fact, in the last years, the North-South territorial gaps is witnessed, in terms of socio-economic determinants, availability, access and satisfaction with good healthcare, self-perceived quality of life for its

citizens and their vulnerabilities, thus recording a fall where levels were lowest, due to the economic crisis [18, 19].

A recent survey showed that in 14 of the 21 Regions and Autonomous Provinces, the system is performing fairly well and is well perceived by citizens. Six Regions, however, are on the verge of financial and service breakdown [4].

The choice to use composites indicators and the selection of singles indicators was made taking into account national and international experiences and other caveats:

- There is no performance definition shared by all experts
- Health care system performance is affected by many circumstances
- Circumstances to be monitored are heterogeneous and interrelates [20] and there is no single indicator able to evaluate health care system performance, composites indicators should overtake these limits
- There are many methods for the construction of composite indicator, those can be based on different techniques of analysis [21] that are valid from the statistical point of view, but at the same time affected by conceptual limits that require choices not lacking of negative implications.

The methodology used for the calculation of the composite indicator has affected the selection process, especially concerning the components “not replaceable”, that is the component for which is not allowed a compensation (for example, regarding the dimension effectiveness is not possible to assume that a low rate of child mortality could compensate a high number of avoidable hospitalisations, and vice versa).

Given these facts, the indicators used to measure each dimension do not pretend to be exhaustive with respect to the many aspects that health care performance evaluation involves. Thus, the evaluation of the performance, that it fallows, must be read exclusively taking into account the dimensions considered, it is not the absolute or global performance and it is the more accurate the more the indicators are linked to the evaluated dimension. The provided dataset, given from the Italian NSIS, is dated 2008. Thus, we are not confident it would significantly measure the impacts of the economic crisis in the above mentioned dimensions. The study does not pretend to be exhaustive in the measurement of the performance, because it investigates only some dimensions of the performance. Therefore the results of this analysis should be read with reference to the components considered and recalling the arbitrariness in the choice of the dimensions measured and in the approximation used for measuring.

Conclusions

At national as well regional level, health systems are complex bodies with several dimensions that make it very difficult to summarize performance, especially through a single measure. By combining separate performance indicators into a single index or measure, ranking or comparing the performance of different systems by providing a bigger picture and offering a more rounded view of performance, composite indicators aim to offer a comprehensive performance assessment [19].

Our study demonstrated that performance of health systems is hardly evaluable and hard to assess, at least in highly regionalized health systems (even within the same health system, wide differences have been highlighted). In Italy, according to the considered dimensions, the typical North-South trend has been revealed. A trade-off effect resulted, so far, between the dimensions of performance, underlining the unbalance that can be caused by different sensitivities of the regional governments on economic efficiency theme rather than fairness.

Some arising questions need to be clarified:

- Is it useful to use conceptual framework to measure health systems performance, both overall and specific and to which extent these are applicable on different contexts?
- How to define the sustainable balance between delivering high-quality services and expenditure control?

References

[1] Figueras J, McKee M editor. Health systems, health, wealth and societal well-being: assessing the case for investing in health systems. 2012. New York: McGraw-Hill International. Available from:

http://www.euro.who.int/__data/assets/pdf_file/0007/164383/e96159.pdf

[2] Paris V, Devaux M, Wei L. Health systems institutional characteristics: a survey of 29 OECD Countries. 2010. OECD Health working papers No. 50. Paris.

[3] Donatini A, Rico A, Lo Scalzo A, D'Ambrosio MG, Orzella L, Cicchetti A, Profili S, a cura di Rico A e Cetani T, Health Care in Transition Profiles. Italy. 2001 Copenhagen: European Observatory on Health Care Systems.

[4] de Belvis AG, Ferrè F, Specchia ML, Valerio L, Fattore G, Ricciardi W. The financial crisis in Italy: Implications for the healthcare sector. Health Policy, 2012; 106(1): 1-104.

[5] Costa G, Marra M, Salmaso S. Gruppo AIE su crisi e salute. [Health indicators in the time of crisis in Italy]. [Article in Italian] Epidemiol Prev. 2012; 36(6):337-66.

[6] Pelone F, Belvis AG, Volpe M, Ricciardi W. Is there a relationship between health care models and their performance assessment? The results of an extensive review. Ital J Public Health 2008; 5(2):102-106.

[7] de Belvis AG, Volpe M. La Relazione Sanitaria: dalle informazioni alle decisioni. Guida per i manager ed i professionisti delle aziende sanitarie. Il Pensiero Scientifico, Roma, 2008.

[8] Solipaca A, Avolio M, Battisti A, Burgio A, Capizzi S, De Belvis AG, De Waure C, Murianni L, Pelone F, Sferrazza A, Specchia ML, Veneziano MA, Ricciardi W, Composite indicators to evaluate the performance of National health systems in Europe: what matters? European journal of public health 2011; 21 (Suppl. 1): 126-126.

[9] Arah OA, Klazinga NS, Delnoij DMJ, Ten Asbroek AHA, Custers T. Conceptual frameworks for health systems performance: a quest for effectiveness, quality, and improvement. International Journal for Quality in Health Care, 2003; 15(5): 377–398.

[10] Lavis JN, and Anderson GM. Appropriateness in health care delivery: definitions, measurement and policy implications. CMAJ. 1996; 154(3): 321–328.

[11] Committee on the National Quality Report on Health Care Delivery. Hurtado MP, Swift EK, Corrigan JM, Editors. Envisioning the National Health Care Quality. 2001. Washington, D.C. National Academy Press.

[12] Hurst J, Jee-Hughes M, Performance measurement and performance management in OECD health systems. In: Labour market and social policy occasional papers no. 47. 2001. Paris: OECD.

[13] Kelley E, Hurst J. Health care quality indicators project. Conceptual framework paper. 2006. Paris: Organisation for Economic Co-operation and Development. OECD Health Working Papers No. 23.

[14] Farrel MJ. The Measurement of Productive Efficiency. Journal of the Royal Statistical Society. Series A (General), 1957; 120(3) 253-281.

[15] Vasselli S. Filippetti G, Spizzichino L 2005 Misurare la performance del sistema sanitario : proposta di una metodologia Roma : Il pensiero scientifico editore, 2005 – XIII World Health Organization. The World Health Report 2000. Geneva: WHO.

[16] Palmer S, Torgerson DJ. Economics notes. Definitions of efficiency. BMJ. 1999; 318:1136.

[17] Ricciardi W, Favaretti C, Bellantone R. A healthy lesson, Italian-style? Italian Journal of Public Heath, 2009; 6(4) 323-9.

[18] ISTAT. The annual report 2013. The state of the Nation. Available from:

http://www.istat.it/en/files/2013/07/Sintesi_Rapp_Annuale_inglese.pdf

[19] Goddard M, Jacobs R. Using Composite Indicators to Measure Performance in Health

Care. In: Smith PC, Mossialos E, Leatherman S, and Papanicolas I, editors. Performance Measurement for Health System Improvement: experiences, challenges and prospects. Cambridge: Cambridge University Press; 2009: Chapter 3.4.

[20] Blank RH and Burau V. Comparative Health Policy. Basingstoke: Palgrave Macmillan 2010.

[21] Jacobs R, Smith P. Goddard M. Measuring performance: An examination of composite performance indicators. A report for the Department of Health. Centre for Health Economics. University of York, United Kingdom 2004.

2. INDICATORS OF HEALTH STATUS AND FUNCTIONING OF THE HEALTH SYSTEM

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Abstract

Health status presents the results of measuring the health of an individual or a group or population using health indicators. Health care is oriented towards the promotion and preservation of health; therefore, it is necessary to monitor and analyze the health of the population as a basis for setting priorities, planning and selection of appropriate measures and activities in the provision of health care. Reasons for the measurement of health status:

- Monitoring of health status of the population and taking action for improvement, analysis of the difference in time
- The study of changes in morbidity and timely response to lessening morbidity
- Analysis of the distribution of health resources and activities for their identification;
- Management of health projects and programs

Health status indicators:

- Life expectancy
- Morbidity
- Standardized mortality rates;
- Incidence and prevalence of chronic mass diseases.
- Registers of vital events in the population (birth certificate, death certificate)
- Routine health statistics.

The health care system in the Republic of Serbia, organized and run it three institutions: the Ministry of Health of the Republic of Serbia, National Health Insurance Fund of Serbia and the Public Health Institute of Serbia "Dr Milan Jovanovic Batut". Public Health Institute of Serbia "Dr Milan Jovanovic - Batut" together with a network of institutes of Public Health in Serbia, collecting data about the health of citizens and the work of health institutions, analyzes the collected data on the health status and suggest measures for improving the health status of the citizens of Serbia , accompanied by the adoption and implementation of plans of health institutions in Serbia, monitor staffing situation in the health care and education of their movement, coordinated development and functioning health information system.

Keywords: indicators of health status

INTRODUCTION

The health status is the results of measuring the health of individuals or population with the help of health indicators. Health care is oriented towards improving and maintaining the

health, it is therefore necessary to monitor and analyze the health of the population as a basis for prioritizing, planning and selection of the necessary measures and activities in the provision of health care.

The health status of the population is not only a collection of assessment of health status of individuals, but the overall picture of the state of health and disease, and other problems related to population health in the community. Changes resulting transition trends in social, economic, and cultural environment affected the change of the concept of health and healthy living.

Development of methodology to measure health status

PHASE I until the end of World War I

- It is characterized by the massive death from infectious diseases
- Register mortality

STAGE II until the end of World War II

• Improvement of sanitary environment

• successful outcome of immunization

• Occurrence of numerous acute diseases

• Register morbidity

STAGE III until the end of the eighties

• It is characterized by AGING POPULATION

• Increased number of patients suffering from chronic not infectious diseases

• Increases the number of days of disability and disablement

• SCALE OF HEALTH

STAGE IV

• Accelerated way of life , a number of factors

• Indicators of quality of life are registered

The definition of health in the spirit of the historic " absence of disease and decrepitude WHO " is far behind us , completely psychophysical health is increasingly conditioned by their own individual concerns and factors within society. Health is increasingly represents a dynamic health, social and economic category , variable under the influence of various factors in the society. Health and health care are not solved exclusively within the health system and can not be viewed in isolation from the social, economic, political and cultural indicators that significantly affect the health of the population.

Reasons for the measurement of health status:

1. Monitoring health status of the population and taking actions for improvement, analysis of the difference in time;
2. Second study of changes in morbidity and timely response in reducing morbidity;
3. Analysis of the distribution of health resources and activities in their equalization;
4. Managing health programs and projects.

Most of the health care system today is characterized by an increase in the number of sectors that deal with health issues and complex relationships between them. The level of expectations of the health system and the needs of the population daily increases, there is less financial resources and rapid development of technology and education. It is evident that the aging population, the intensification of the "forgotten " and the presence of new diseases.

The basic function of public health is to assess the health status of the population and the health care organization with the goal of improving the health sector and the community. Assessment of health status is based on monitoring and analysis of the determinants of health, leading causes of mortality and morbidity of the population. Results of research on the lifestyle and habits of the population are the basis for the organization of an efficient health care system oriented to health promotion and disease prevention.

The objectives of the assessment of the health status of the population are:

1. Registration of the most important health problems;

2. Evaluation and monitoring changes in health status;

3. Analysis of differences between individual groups of population and territories with the aim of reducing inequalities;

4. Implementation of measures to improve the health status of population;

5. Improving the model of financing and health management.

Indicators of health

1. Life expectancy;
2. Morbidity;
3. Infant mortality, perinatal mortality;
4. Standardized mortality rates;
5. The incidence and prevalence of chronic mass diseases.
6. The registers of vital events in the population (birth certificate, death certificate);
7. Routine health statistics.

In the City of Nis we have 19,1% older than 65. The mean age of the population was 43.1 years, the aging index is 141.2.

The birth rate is 8.6 ‰, the general fertility rate, 38.7 ‰, the mean age of mothers at elivery 29 years, born in marriage was 75.6% of children, the rate of nupciality was 4.2 ‰, the rate of divorceiality 1,3 ‰, divorce rate/ 1000 marriages 303 ‰ (one third), low birth weight 8.2% of newborns.

Overall mortality rate was 15.0 ‰, the natural increase was 6.3 ‰, life expectancy from 2010 to 2012. year. M = 72.5 and F = 77.3 years, the infant mortality rate was 8.6 ‰, the rate of early neonatal mortality rate was 3.7 ‰, the perinatal mortality rate of infants was 11.6 ‰, the rate of mortality was 8.0 ‰, the mortality rate of children under 5 years was 3.7 ‰.

In the structure of causes of death and cardiovascular disease continues to lead with 49.7%, with 21.7% of tumors, insufficiently defined conditions R00-R99 with 7%.

The health care system in the Republic of Serbia, organized and run it three institutions: the Ministry of Health of the Republic of Serbia, National Health Insurance Fund of Serbia and the Public Health Institute of Serbia "Dr Milan Jovanovic Batut".

The Ministry of Health is responsible for the overall organization and operating health system in and the preservation and improvement of public health, responsible for the operation of health insurance, regulated health policies, determines standards for work of ealth services, regulating quality control mechanisms and controls, organizes and monitors the work of the inspection services in the field of health care and total oversees and promotes the work of health institutions in Serbia.

Republic Health Insurance Fund of Serbia raises funds for health insurance that citizens pay from salaries and fund the provision of health care. Negotiate and finance the work of health

institutions in Serbia purchasing plans of health facilities and controls the fulfillment of contractual obligations. Financing of health care institutions is based on the current situation and the available resources of the Fund. Absolutely funded health care provision in the health care plan from the network, except institutes for public health and health facilities that provide rehabilitation services.

Public Health Institute of Serbia "Dr Milan Jovanovic - Batut" together with a network of institutes of Public Health in Serbia, collecting data about the health of citizens and the work of health institutions, analyzes the collected data on the health status and suggest measures for improving the health status of the citizens of Serbia, accompanied by the adoption and implementation of plans of health institutions in Serbia, monitor staffing situation in the health care and education of their movement, coordinated development of health information system. Performs other healthcare services in the field of social medicine, hygiene, epidemiology and microbiology.

Health care is organized and operates through primary, secondary, and tertiary health care through health care at all three levels.

At the primary level of health care provided by health centers, pharmacies and institutes. Serbia has organized 158 health centers, 35 pharmacies and 16 institutes. Insured health insurance fund users used services at the primary level only with health card. Insured Fund for health insurance usually included in the health care system right in the home health, and with the guidance of his chosen doctor moving towards health institutions of secondary and tertiary health care. Within the framework of activities of the Public Health Institute in Nis organized 12 community health centers.

Health care at the primary level include:

1) protection and promotion of health, prevention and early detection, treatment, rehabilitation of sick and injured;

2) preventive health care to the population groups exposed to increased risk of disease and other residents, in accordance with a special program of preventive health care;

3) health education and counseling for health improvement;

4) The prevention, early detection and control of malignant disease;

5) the prevention, detection and treatment of diseases of the mouth and teeth;

6) home care visits, treatment and rehabilitation at home;

7) Prevention and early detection of disease, health care and rehabilitation for persons placed in institutions for social welfare;

8) emergency medical care and ambulance transport;

9) pharmaceutical health care;

10) Rehabilitation of children and youth with disabilities in physical and mental development;

11) mental health;

12) palliative care;

At the secondary level in the Republic of Serbia, it is organized the 77 hospitals, 40 general and 37 special. Patients are referred to the hospital when their health problems beyond the competence of medical doctors of primary health care home health conditions or need an expert opinion of a higher level of health care. At this level of health care is organized in the

area Nisava and Toplica administrative district of five general hospitals and three specialty hospitals.

Health care at the secondary level involves specialized consulting business. In relation to health activity at the primary level include more complex measures and procedures for the detection of diseases and injuries as well as treatment and rehabilitation of sick and injured with the use of appropriate equipment and personnel as prescribed by the Ministry of Health. Hospital health activities include the diagnosis, treatment and rehabilitation, health care and accommodation in hospitals, and pharmaceutical services in a hospital pharmacy.

When exhausted all treatment options in general or special hospital patient is referred to the highest level of care at the tertiary level. Refers to the clinical centers in our country which has 4 (Belgrade, Nis, Novi Sad and Kragujevac) or one of the clinics (6) or institute (16) and KBC (4). At this level of care patient arrives with instructions chosen physician, based on the advice of medical doctors in general and special hospitals.

Health care at the tertiary level includes the provision of the most complex forms of health care and specialist-consultative and hospital health activities with the use of sophisticated equipment and more specialized medical doctors. This level of care is organized in places where there is a college of health professions. So that in these institutions carry out scientific research and educational activities. In the area of activity of the Public Health Institute in Niš has two tertiary health institutions.

For more levels of health care in the Nisava and Toplica administrative district organized by the Public Health Institute, Department of Forensic Medicine and the Institute for Blood Transfusion

3. WRITING AND PRESENTING SCIENTIFIC PAPERS

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Objectives: The aim is to inform scientists and health professionals with the basic elements of writing and presenting scientific papers.
Materials and methods: Defining the rules of correct citation and academic writing is determined on the basis of the APA and the Vancouver Convention, in order to reach the necessary level of academic writing.

Results: In accordance to the Vancouver Convention parts of the manuscript are: Title page; Abstract with Key words; Text; Acknowledgements (to the authors' desire), References, and Enclosures. The text of the articles includes: Introduction, Methods, Results, and Discussion. Results should be presented in logical sequence in the text, tables and illustrations. Emphasize or summarize only important observations. Discussion is to emphasize the new and significant aspects of the study and the conclusions that result from them. Relate the observations to other relevant studies. Long articles may need subheadings within some sections to clarify their content.

Conclusion: Writing a scientific paper is the most common way of communicating the results of research to other scientists and to health professionals. It goes without saying that authors should at all times have in mind objectivity, clarity and honesty in reporting their research. The format for writing a scientific paper for publication in biomedical journals has been standardized to provide a systematic and organized way to present the data.

Key words: Writing, presenting, scientific papers

The standard of academic writing and correct citation have long been accepted in the world , while with us still meet with texts that are written out of the rules, which is difficult to follow and that are understandable only to the authors and the inner circle of insiders.

The basics of international standards writing tied to 1928. when a group of publishers met in Madison Bently (USA), made a report and published 7 pages entitled Psihologycal Bulletin, which is now known journal of the American Psychological Association (APA). The document was revised in 1952, then 1974, then 1983 and 1984, and the last version of the 436 page was published in 2007.

In late 20th century APA standards and Vancouver convention, have become a major documents within which they move instructions to authors of most magazines and publishing houses.

Scientific work is a written and publicized report from original research that contributes to knowledge and understanding of a problem , and that can be checked and repeated by any

competent researchers. Published papers represent a stimulus for further research and their number is an indicator of creative productivity of researchers.
Types of scientific papers are: Original scientific papers, review articles, letters to the editor, preliminary reports, theses and presentations at conferences. Original scientific papers are the most important publications and the primary source of scientific information and a carrier of new ideas and knowledge.

Preparation of manuscript

Parts of the manuscript are: Title page; Abstract with Key words;Text; Acknowledgements (to the authors' desire), References, Enclosures.

1. Title page

a) The title should be concise but informative, while subheadings

should be avoided;

b) Full names of the authors have to be signed with exact names and places of department(s) and institution(s) ofaffiliation where the studies were performed, city and the state for anyauthors, clearly marked by standard footnote signs;

2. Abstract and key words

The second page should carry a structured abstract (250-300 words for original articles and meta-analyses) with the title of the article. In short, clear sentences the authors should write the Background/Aim, major procedures–Methods (choice of subjects or laboratory animals; methods for observation and analysis), the obtained findings – Results (concrete data and their statistical significance), and the Conclusion. It

should emphasize new and important aspects of the study or observations. A structured abstract for case reports (up to 250 words) should contain subtitles Introduction, Case report, Conclusion). Below the abstract Key words should provide 3–10 key words or short phrases that indicate the topic of the article.

3. Text

The text of the articles includes: *Introduction, Methods, Results, and Discussion*.

Introduction. The introduction should tell the reader why the research was started, and make clear what question the research was designed to answer. Research is not a fishing expedition. It is designed with a specific question in mindAfter the introductory notes, the aim of the article should be stated in brief (the reasons for the study or observation), only significant data from the literature, but not extensive, detailed consideratuion of the subject, nor data or conclusions from the work being reported.

Methods. Replicability of results is the heart of science. The methods section should provide a detailed exposition of the research design. A reader of the methods section should be able to repeat the study and to validate the findings. A methods section less than two double-spaced pages is probably inadequate.The selection of study or experimental subjects (patients or experimental animals, including controls) should be clearly described. The methods, apparatus (manufacturer's name and address in parentheses), and procedures should be identified in sufficient detail to allow other workers to reproduce the results. Also, give

references to established methods, including statistical methods. Identify precisely all drugs and chemicals used, with generic name(s), dose(s), and route(s) of administration. State the approval of the Ethnics Committee for the tests in humans and animals.

Results. The objective of the research should be kept in mind. Results that do not relate to the research objective should not be mentioned. Sufficient detail should be given to allow

other scientists to assess the validity and accuracy of the results. Statistics should not take over the paper, but statistical analysis of the results should be adequately described. Results should be presented in a logical sequence in the text, tables, and illustrations. Tables and graphs are often extremely helpful in summarizing large amounts of data. Authors should not repeat in the text the numerical data contained in figures and tables. should be presented in logical sequence in the text, tables and illustrations. Emphasize or summarize only important observations.

Discussion is to emphasize the new and significant aspects of the study and the conclusions that result from them. Relate the observations to other relevant studies. Link the conclusions with the goals of the study, but avoid unqualified statements and conclusions not completely supported by your data. Good papers have a targeted discussion, to keep it focused. The discussion should preferably be structured to include the following six components (Docherty and Smith, 1999):

• statement of principal findings

• strengths and weaknesses of the study

• strengths and weaknesses in relation to other studies

• meaning of the study, possible mechanisms and implications for clinicians and

policymakers

• unanswered questions and future research

• conclusion.

References. References should be superscripted and numerated consecutively in the order of their first mentioning within the text. All the authors should be listed, but if there are more than 6 authors, give the first 6 followed by et al. Do not use abstracts, secondary publications, oral communications, unpublished papers, official and classified documents. References to papers accepted but not yet published should be cited as ”in press“. Information from manuscripts not yet accepted should be cited as ”unpublished data“. Data from the Internet are cited with the date of citation.

Tables and Illustrations. Each table should be typed on a separate sheet, numbered in the order of their first citation in the text in the upper right corner and supplied with a brief title each. Explanatory notes are printed under a table. Each table should be mentioned in the text. Any forms of graphic enclosures are considered to bi figures and should be submitted as additional databases in the System of Assistent. Letters, numbers, and symbols should be clear and uniform, of sufficient size that when reduced for publication, each item will still be legible. Each figure should have a label on its back indicating the number of the figure,

author's name, and top of the figure (Figure 1, Figure 2 and so on). If a figure has been published, state the original source.

Citation of references

The reference section is an important part of a scientific paper. The number of references should be restricted to those that have a direct bearing on the work described. Except for review articles, it is rarely necessary to have more than 40 references in the longest paper (Halsey, 1998). Different standard formats for citing references are used in different scientific disciplines. In biomedical sciences, there are two major styles for citing the references: the Harvard system and the Vancouver system.

Steps in the process of writing a paper

The process of writing a scientific paper should start before doing the research, continue during the research, and be completed after the research results have been described, analysed and interpreted.

Before the research

• Search the literature and keep a record of the references.

• Prepare dummy tables for results.

During the research

• Record the results.

• Update the literature.

After completion of the research

• Use a systematic approach, building the paper step by step. Do not try to do the whole thing at once.

• The discussion is the part that requires most careful thought and interpretation.

• Begin with the easiest section. Deal with individual sections one at a time.

• Decide on the journal to which the article will be submitted and study its format requirements.

• Write the rough draft: Once you start, write as fast as you can. Do not worry about style.

• Put the paper aside for several days or weeks and then re-read it.

• Give a version of the paper to a colleague or colleagues to review it.

After successfully performed research and written work by all applicable criteria remains another, perhaps the most difficult step. This step is the selection of magazines, sending and

accepting work for publication. Acceptance of paper and printing is actually a crown work and proof that hard work was not in vain.

Charles Darwin said, "A scientist's life would be a happy one if he had only to observe and never to write."

References

1. Lester JD, Lester JD, Jr. Writing research papers: a complete guide, 10th edition. New York, Longman, 2002.
2. H. Leisma, Modeling the Relevance of Sentences. Detecting Domain Specificity and Semantic Relatedness from Scientific Texts, M.Sc. thesis, School of Computing, University of Eastern Finland, 2011
3. T. Turunen, Introduction to Scientific Writing Assistant (SWAN) - Tool for valuating the Quality of Scientific Manuscripts, M.Sc. thesis, School of omputing, University of Eastern Finland, 2013
4. Pearce N. Style: What is it and does it matter? In: Hall GM, ed. How to write a paper, 2nd edition. London, BMJ Books, 1998: 116–121.
5. Pipkin FB. How a thesis or dissertation is assessed or examined. In: O'Brien PMS, Pipkin FB, eds. Introduction to research methodology for specialists and trainees. London, Royal College of Obstetricians and Gynaecologists Press, 1999: 248–253.
6. Skelton JR, Edwards SJL. The function of the discussion section in academic medical writing. British Medical Journal, 2000, 320: 1269–1270.
7. Strunk W Jr. The elements of style. 4th edition. New York, Longman, 2000.
8. Wildsmith JAW. How to write a case report. In: Hall GM, ed. How to write a paper. 2nd edition. London, BMJ Books, 1998: 70–76.
9. Ambrose, H. W., III. and K. P. Ambrose. 1995. A handbook of biological investigation. 5th ed. Hunter Textbooks, Inc. Winston-Salem, NC.

4. SETTING THE MAIN CRITERIA TO PLAN CARE PATHWAYS

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Abstract

Objectives: A care pathway is a complex intervention for the mutual decision making and organisation of care processes for a well-defined group of patients during a well-defined period. Care pathways provide better health care and reduce unnecessary variations in practice. It is a relatively new clinical process improvement tool that has been gaining popularity across various healthcare institutions worldwide. A care pathway defines the optimal care process, sequencing and timing of interventions by healthcare professionals for a particular diagnosis or procedure. The objective of the study was to to find out whether there is universal care pathway pattern for health care facilities and to derive key characteristics of care pathways.

Materials and methods: Our investigation was done in UCSC, Rome, Italy, from March to April 2014. Our search strategy was finding proper information on Pubmed and Embase, for which we used the following terms: "care pathway", "critical pathway", "clinical pathway" or "integrated care pathway". We also searched the reference lists of relevant articles. To approach the best analyses, the DELPHI method was used.

Results: We focused on 32 existing articles about care pathways developed by individual hospitals for specific diseases. Care paths were developed through collaborative efforts of physicians, nurses, pharmacists, and others to improve the quality and value of patient care. They were designed to minimize delays and resource utilization and to maximize quality of care. Care pathways were also used as a tool to implement local and national guidelines into everyday practice. But, national health systems are different from each other, and healthcare institutions within the same system have their own individual characteristics. When selecting an appropriate topic to develop a care pathway, the criteria like common condition or high-risk condition was mostly taken into account. They became a documented sequence of clinical interventions that help a patient progressively move through a clinical experience to a desired outcome.

Conclusions: There is no universal form of care pathway that could be consistently applied in all health facilities. It is necessary for each institution in accordance with their needs to develop its own care pathways, because they are specific. Physicians and practitioners have to be the key players in any pathway development and implementation. There is a real danger when critical pathways are brought in from external sources on the basis of administrative attempts to reduce costs.

Main messages: Physicians have to be the key players in any pathway development and implementation. It is essential to design and implement care pathways into organisational strategy which will provide its improvement into everyday practice.

INTRODUCTION

Many synonyms exist for the term ICPs (Integrated Care Pathways) including: Clinical Pathways, Critical Pathways, Multidisciplinary pathways of care, Pathways of Care, Care Maps, Collaborative Care Pathways, Critical or Clinical Paths.

Critical Path and Process Mapping methodology was used in industry, particularly in the filed of engineering from as early as the 1950s. In the 1980's, clinicians in the USA began to develop the pathway tool within Managed Care; they were redefining the delivery of care and attempting to identify measurable outcomes. They were focusing on the patient rather than the system, but needed to demonstrate efficient processes in order to fulfill the requirements of the insurance industry. Developed and used initially for the purpose of cost containment, in the UK in the late 1980s, the emphasis has been to use clinical pathways as a quality tool. They were developed in response to the initial Diagnostic Research Group based prospective reimbursement system of the early 1980's at the New England Medical Center by Karen Zander and Kathleen Bower, among others. In the early 1990's the NHS in the U.K. funded a patient focused initiative to support organizational change. This resulted in the investigation and development of concepts such as pathways.

Clinical Pathways as introduced in the early 1990s in the UK and the USA were being increasingly used throughout the developed world. Clinical or Critical Pathways are structured, multidisplinary plans of care designed to support the implementation of clinical guidelines and protocols. They are designed to support clinical management, clinical and non-clinical resource management, clinical audit and also financial management. They provide detailed guidance for each stage in the management of a patient (treatments, interventions etc.) with a specific condition over a given time period, and include progress and outcomes details.

Clinical Pathways aim to improve, in particular, the continuity and coordination of care across different disciplines and sectors.

Care Pathways can be viewed as algorithms in as much as they offer ***a flow chart*** **format** of the decisions to be made and the care to be provided for a given patient or patient group for a given condition in a step-wise sequence. A clinical pathway is a tool used in achieving coordinated care and desired outcomes within an anticipated time frame by utilizing the appropriate resources available. It is a blueprint that guides the clinician in the provision of care. ICPs are preconceived patient care algorithms, or paths, that are intended to reduce variability and cost, increase efficiency, and ultimately improve patient care. Pathways provide patient focused care with benefits to the patient, family and members of the multi-disciplinary team. They allow for the continuous evaluation and improvement of clinical practice and help to stimulate research. Their use represents a new approach to patient care, fulfilling many of the demands of clinical practice.

Critical pathways as care plans that detail the essential steps in patient care with a view to describing the expected progress of the patient have four main components:

- a timeline
- the categories of care or activities and their interventions
- intermediate and long term outcome criteria and
- the variance record (to allow deviations to be documented and analysed).

Critical paths are developed through collaborative efforts of physicians, nurses, pharmacists, and others to improve the quality and value of patient care. They are designed to minimize delays and resource utilization and to maximize quality of care. Clinical Pathways differ from practice guidelines, protocols and algorithms as they are utilised by a multidisciplinary team and have a focus on the quality and coordination of care. The approach and objectives of clinical pathways are consistent with those of total quality management (TQM) and clinical continuous quality improvement (CQI).

A clinical pathway is a method for the patient-care management of a well-defined group of patients during a well-defined period of time. A clinical pathway explicitly states the goals and key elements of care based on Evidence Based Medicine (EBM) guidelines, best practice and patient expectations by facilitating the communication, coordinating roles and sequencing the activities of the multidisciplinary care team, patients and their relatives; by documenting, monitoring and evaluating variances; and by providing the necessary resources and outcomes.

The aim of a clinical pathway is to improve the quality of care, reduce risks, increase patient satisfaction and increase the efficiency in the use of resources.

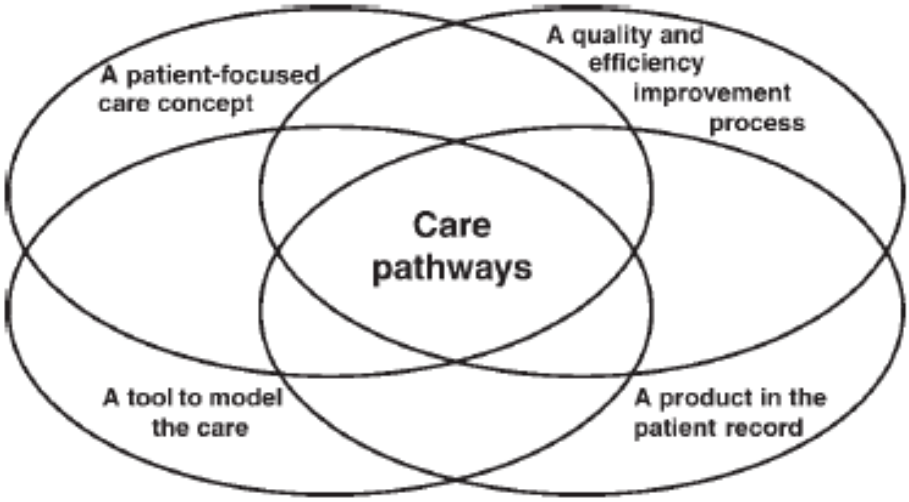

Figure 1 Care pathways as a concept, model, process and product

The European Pathway Association (EPA) defines a care pathway as “a complex intervention for the mutual decision making and organization of care processes for a well-defined group of patients during a well-defined period”.

It is important that physicians and practitioners be key players in any pathway development and implementation. There is a real danger when critical pathways are brought in from external sources and implemented on the basis of administrative attempts to reduce costs.

The real impact of critical pathways and appropriateness protocols is their use as tools for collection of information. Pathways can serve as a screening test for inefficient care. The danger is that a pathway with too many critical areas under review will be too sensitive, resulting in the review of a large number of marginally appropriate cases. Review of critical pathway data should be focused on the highest-impact areas in terms of either cost, quality of care, or preferably, both.

But the first issue is that critical pathways address processes in the “ideal” patient and in some cases do not address issues in the majority of patients who enter the path. Identification of appropriate patients to enter the pathway is an important issue in implementation. In general,

critical pathways are more applicable to patients with uncomplicated illnesses who are undergoing procedures or surgery.

Integrated Clinical Pathway development:

1. **Select a Topic**

Topic selection in general should concentrate on high-volume, high-cost diagnoses and procedures.

2. **Select a Team**

It is important to develop a multidisciplinary team for critical pathway development. Active physician participation and leadership is crucial to the development and implementation of the pathway.

3. **Evaluate the Current Process of Care**

Data are key to understanding current variation. Scan a map of processes. Providing a framework for collecting data on the care process.

4. **Evaluate Medical Evidence and External Practices (Evidence-Based Medicine)**

After key rate-limiting steps have been identified, the critical pathway team must evaluate the literature to identify evidence of best practices.

5. **Determine the Critical Pathway Format**

The format of the pathway may vary widely. Important features include a task-time matrix in which specific tasks are specified along a timeline. There is a spectrum of pathways that range from a form that takes the place of the medical record to a simple checklist. A reduction in charting that may occur with more complicated pathways is a benefit. However, if the pathway format is too difficult to follow, it will not be used.

6. **Document and Analyze Variance (Evaluation)**

Variances are patient outcomes or staff actions that do not meet the expectation of the pathway. In general, variance in clinical pathways is a result of the omission of an action or the performance of an action at an inappropriate (often late) time period. Because the critical pathway is a series of time-associated actions, this analysis of variance can be overwhelmed by multiple data points. Another approach is for the pathway team to concentrate on a few critical items in the pathway that have been identified in advance, such as extubation time after cardiac surgery or length of stay in the intensive care unit.

7. **Pathway implementation**

Critical pathway implementation can be a challenge, and if not handled well, it can generate major obstacles. Factors critical in implementation include education of all staff members who will be involved in any component of the pathway. This is particularly true of non participants in

pathway development. Concerns and misconceptions about the pathway should be addressed. One obvious concern would be repercussions of failure to follow the clinical pathway.

A synergy appears to develop when pathways and algorithms are used together.

Clinical pathways are multidisciplinary plans (or blueprint for a plan of care) of best clinical practice for specified groups of patients with a particular diagnosis that aid in the coordination and delivery of high quality care. They are a documented sequence of clinical interventions that help a patient with a specific condition or diagnosis move, progressively through a

clinical experience to a desired outcome. Predominantly, they are management tools and clinical audit tool that are based on clinical information developed in other guidelines or parameters. They are specific to the institution using them.

Recognized benefits of ICPs are:

- Support the introduction of evidence-based medicine and use of clinical guidelines
- Support clinical effectiveness, risk management and clinical audit
- Improve multidisciplinary communication, teamwork and care planning
- Can support continuity and coordination of care across different clinical disciplines and sectors
- Provide explicit and well-defined standards for care
- Help reduce variations in patient care (by promoting standardisation)
- Help improve clinical outcomes and improve and even reduce patient documentation
- Support training and optimise the management of resources
- Can help ensure quality of care and provide a means of continuous quality improvement
- Support the implementation of continuous clinical audit in clinical practice
- Support the use of guidelines in clinical practice
- Help empower patients, manage clinical risk and improve communications between different care sectors
- Disseminate accepted standards of care and provide a baseline for future initiatives
- Not prescriptive: don't override clinical judgement
- Expected to help reduce risk and costs by shortening hospital stays.

Potential problems and barriers to the introduction of ICPs are:

- May appear to discourage personalised care
- Risk increasing litigation
- Don't respond well to unexpected changes in a patient's condition
- Suit standard conditions better than unusual or unpredictable ones
- Require commitment from staff and establishment of an adequate organisational structure
- Problems of introduction of new technology
- May take time to be accepted in the workplace
- Need to ensure variance and outcomes are properly recorded, audited and acted upon.

Anyway, issues for discussion which still remain in everyday practice are the differences between clinical protocols/ guidelines and care pathways.

An integrated critical or clinical pathway defines the optimal care process, sequencing and timing of interventions by healthcare professionals for a particular diagnosis or procedure. That is why it is essential to design and implement care pathways into organisational strategy which will provide its improvement and also to be used as a tool to implement local and national guidelines into everyday practice. But, national health systems are different from each other, and healthcare institutions within the same system have their own individual characteristics. When selecting an appropriate topic to develop a care pathway, the criteria like common condition or high-risk condition is mostly taken into account. They become a documented sequence of clinical interventions that help a patient progressively move through a clinical experience to a desired outcome.

There is no universal form of care pathway that could be consistently applied in all health facilities. It is necessary for each institution in accordance with their needs to develop its own care pathways, because they are specific. Physicians and practitioners have to be the key players in any pathway development and implementation. There is a real danger when critical pathways are brought in from external sources on the basis of administrative attempts to reduce costs.

5. EMBEDDING RESEARCH INTO HEALTH CARE SYSTEM: EXPERIENCE FROM ENGLAND, UK

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Abstract

Research plays a key role in developing public health policy and practice. According to the World Health Organisation's last year report, universal health coverage, with full access to high-quality services for health promotion, prevention, treatment, rehabilitation, palliation and financial risk protection, cannot be achieved without evidence from research. Preventive medicine too, as a field of public health, can only be effective if informed by research and evidence.

In this presentation, the aim was to describe some experiences of embedding research into health care from the UK National Health Service (NHS), and in particular such practice across England. As this is one of the largest single healthcare systems in the world, it should offer a unique insight on relevant practical health research policy initiatives.

The objectives were first to present some facts related to the NHS and health research, then to describe some barriers encountered in embedding such research into daily practice and finally to mention some of the UK government policies that directly or indirectly address health care research. In particular, the attention way paid to two pieces of the UK health care legislation (Health and Social Care Act, 2012 and Care Act, 2014) and their attributed impact on the research by presenting some data on current participant recruitment in the NHS.

Benefits of research: public health and preventive medicine

Research plays a key role in developing public health policy and practice. According to the World Health Organisation's last year report, titled "Research for Universal Health Coverage", universal health coverage, with full access to high-quality services for health promotion, prevention, treatment, rehabilitation, palliation and financial risk protection, cannot be achieved without evidence from research.

One of the key messages from the report was that research for universal health coverage requires national and international backing. Embedding research into health care systems was recommended, principally through developing national research agendas, raising funds, strengthening research capacity, and making appropriate and effective use of research findings.

Preventive medicine too, as a field of public health, can only be effective if informed by research and evidence. For example, findings from studies on the health effects of high salt intake have led to a reduction in the salt content of processed foods; and research has guided the introduction of new immunisation programmes, such as the meningitis C vaccine that has been extremely successful in controlling the disease. Research is also critical to evaluate whether public health policies and practice are effective. Studies have shown that the number of hospital admissions for heart attacks has reduced since the introduction of the ban on

smoking in public places. In this presentation, I aim to describe some experiences of embedding research into health care from the UK National Health Service (NHS), and in particular such practice across England. As this is one of the largest single healthcare systems in the world, it should offer a unique insight on relevant ractical health research policy initiatives.

My objectives are to first present some facts related to the NHS and health research, then describe some barriers encountered in embedding such research into daily practice and finally mention some of the UK government policies that directly or indirectly address health care research. In particular, I will draw your attention to two pieces of the UK health care legislation (Health and Social Care Act, 2012 and Care Act, 2014) and their attributed impact on the research by presenting some data on current participant recruitment in the NHS.

About NHS

The health care system in the UK has workforce that includes 1.3 million NHS employees in England, 1.5 million community services employees and 5 million community carers. There is an estimate that UK employs 25% of all those who work in the medical biotechnology sector in Europe.

The NHS is an ecosystem split between commissioners and providers. It also places an emphasis on GPs and clinicians to influence commissioning decisions in response to their patients' needs. There are 250 secondary care Trusts, and primary care is delivered by 20,000 GPs across 8,000 practices. Since its inception in 1948, envisaged as the service "free for all at the point of care" the NHS has enjoyed a 4% increase in expenditure in real terms year on year, although these finances have been frozen since 2011. Currently, the commissioners have been allocated £65 billion to spend on healthcare. Previously, research in the NHS suffered through the diversion of money intended for research and infrastructure support into direct patient care. NHS managers are subject to intense pressures to deliver immediate healthcare targets, and understandably afford a low priority to research. As a result, the NHS was often perceived by the academic and commercial community to be a challenging and inconsistent research partner.

Drivers for embedding research into UK health care system

Consistent with the global health strategy, the current UK government, particularly in England, has now committed themselves to have research at a core of the healthcare system. The public overwhelmingly believe the NHS should support research into new treatments – 93% believe their local NHS should be encouraged or required to support research (*Ipsos MORI, 2011. Public support for research in the NHS. AMRC: London*). The NHS have responded to this by stating in their constitution that it is committed "*… to innovation and to the promotion and conduct of research to improve the current and future health and care o f the population*". The UK government has also recognised that investing in research in the NHS and in public health is vital to improve all aspects of patient care, including prevention, diagnosis and treatment, and ultimately patient outcomes. There is evidence that research has facilitated the introduction of new innovations and approaches which ultimately saved the NHS money. In 2009-10, public funders invested almost £3 billion in health research in the UK, with over £1 billion coming from medical research charities. A vibrant research

environment in the NHS brought broader societal benefits including employment and investment from the pharmaceutical industry as it made the UK a more attractive location for research. For example, there is data showing that a £1 increase in government or charity spending on medical research could lead to an increase in private research spending from the pharmaceutical industry of between £2.20 and £5.10.

Specific national health research strategies adopted so far are the Strategy for UK life Sciences (2011) aiming to facilitate increased collaborations between industry, the NHS and academia and Innovation Health and Wealth, accelerating adoption and diffusion in the NHS (2012).

In relation to research structures, the UK government created back in 2006 the National Institute for health Research (NIHR).This is a principal national institution for driving research into healthcare setting, acting as central research facilitation, training and commissioning organisation. It has also established a number of Clinical Research Networks principally intended to facilitate implementation of clinical research into NHS. The NIHR has ringfenced budget, currently around £1 billion.

More recently, in 2013 the government established Academic Health Science Networks (AHSN). Their main aim is to improve patient outcomes and generate economic benefits for the UK by promoting and encouraging the adoption of innovation in healthcare. There are currently 15 such networks across England, and It is estimated that their funding will be in the region of £2 per head of population served. With a population averaging 3m people, a typical AHSN might have expected roughly £6m per AHSN per year.

Some barriers identified to successful embodiment of research into health

system

-Time taken to navigate complex research approval processes. An analysis from Cancer Research UK showed that after its funding for a study has been agreed, it has taken an average of 621 days to recruit the first patient (N=25 studies, period November 2006 to July 2007)

-Changes to organisational structures and culture are required to support research. This needs the engagement of staff at all levels. Leadership and high-level recognition of the value of research are

particularly important.

-Healthcare commissioners appear not to have sufficient support to establish, coordinate and develop expertise that allows them to engage meaningfully with research.

-There is little evidence that patient and public engagement is integrated

‘at all levels of the health and wellbeing system’ including research as a core component of that system. Involving patients and the public in research helps deliver high quality, more relevant research.

-There are no viable safe and secure systems and governance arrangements that enable researchers sufficiently to access both anonymous and identifiable patient information for important research, while protecting patients and researchers.

-There is need for a workforce and leadership trained to demand,understand and utilise research and innovation to improve patient care.

-The practice of the adoption and spread of new innovations within the NHS is often very slow and sometimes even the best of them fail to achieve widespread use.

An intervention to towards effective health research: Legislation

In addressing some of the barriers to embedding research into health care, the British Government has brought about for the first time in the history of health legislation a new Act that directly referred to the duty of ensuring research is used and promoted across the health care system. This is also

one of rare examples of such legislation worldwide. This Act is known as Health and Social Care Act 2012 (HSCA). Collateral to enactment of the Act, the NHS England has started a public consultation on the health research strategy. This consultation is currently on-going, but there have been few themes that form bases for such strategy. These are:

-Identifying and prioritising commissioning health services research topics and coordinating this work with the Department of Health, NIHR, Health Research Authority, research charities, industry and other stakeholders.

-To develop the evidence base in relation to models of commissioning to ensure the approach to commissioning services is based on best research evidence and effectiveness.

-To increase capacity amongst NHS England and commissioning staff to undertake research, and to utilise the outcomes of research, thereby increasing the quality of care and treatment.

-To ensure the inclusion of patients in setting priorities for research and participation in the design, delivery, and dissemination of research.

-To promote the ideal that every patient coming into the NHS is offered an opportunity to take part in research.

-To increase the availability of information on current and completed

research and research outcomes to the public.

-To maximise the benefits from research through innovation, income, knowledge improvement and impact.

Another recent legislation to influence health research is the Care Act 2014. Some of the relevant provisions were establishing the Health Research Authority (HRA) as statutory non-departmental public body, with a remit to protect the interests of people in health and social care research. This act enables the HRA to lead in standardisation and implementation of effective research governance and ethics procedures for obtaining approvals to implement health research in the NHS. In addition, HRA ensures publishing research summaries and Research Ethics Committee opinions, promoting trial registration (desirable for all studies, and mandatory for clinical trials) and work towards mandatory publication of research results/data. There is a consensus in the UK research community that the current health care legislation was one of the most effective intervening variables contributing to driving and maintaining effective patient recruitment into research studies across England. The following data provided by the NIHR on patient recruitment into research studies in the NHS for 2013/14 goes towards backing up this claim:

_ For the first time, 100% of NHS Trusts recruited into research` studies

_ There were 604,216 participants recruited into clinical studies, which is 21% above target;

_ Over 77% of studies obtained research implementation permission at all sites within 40 calendar days (around 3% short of declared target)

_ There were an increased proportion of commercial contract studies in the NHS, with the recruitment above target by 22%.

_ Performance on the delivery of commercial contract studies to time and target has reached 73%, which is a 25% increase on performance compared to 2012/13.

(Comparison figures for the performance before year 2012, i.e. pre-legislation, in the appendix)

Conclusions & Implications for preventive medicine

In conclusion, a demonstrated high level commitment from policy makers, particularly if backed up in a form of enacted legislation, can significantly contribute to efficient and effective embodiment of research into the health system. Some other specific policy-level and practical recommendations

coming out form the UK experiences are:

o Provision of details of how the commitments to promote research and innovation will be delivered in practice

o Development of mechanisms to deliver research locally

o Establishment of streamlined and robust regulation and governance of health research

o Integration of meaningful patient and public involvement in research

o Enablement of the safe and secure use of patient data for research

o Development of the health research workforce

o Support for innovation in the health system

These recommendations are fully consistent with the WHO measures outlined in the "Research for Universal Health Coverage" report. They will also have implications for preventive medicine practice, as it is expected there will be more opportunities to establish a good research-evidence base for variety of preventive programmes.

B.S.P.Savelyich: Embedding Research into Health Care System: Experience from England, UK

References:

Academia, Industry and the NHS: Collaboration and innovation. The Academy of Medical Science, Meeting Report October 2010. AMS: London

Care Act 2014 (c.23). House of Parliament, TSO: London

Embedding Research into the Health System. The Academy of Medical Science, October 2011. AMS: London

Health and Social Care Act, 2012 (c.7). House of Parliament, TSO: London

House of Commons 1048-III Health Committee - Written evidence from a Coalition of biomedical research stakeholder organisations and research funders (PH 157). Proceedings of the Committee, June 2011 House of Commons, London: The Stationery Office Limited

House of Commons Science and Technology Committee - Third Report: Clinical Trials. Proceedings of the Committee, September 2013. House of Commons, London: The Stationery Office Limited

Ipsos MORI, 2011. Public support for research in the NHS. AMRC: London

NIHR Clinical Research Network Performance Report 2013/14. NIHR: Leeds The World Health Report 2013: Research for universal health coverage. Geneva, World Health Organization

WHO Strategy on Research for Health. Geneva, World Health Organization, 2012.

ORAL PRESENTATIONS

1. SETTING THE QUALITY INDICATORS FOR DIABETES CARE IN PRIMARY HEALTH CARE

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Objectives: This study was aimed to analyse quality indicators in diabetes health care and to explore problems that occurred during the indicators collection.

Materials and methods: We used data collected in 16 primary health centres in Belgrade from 2010 to 2013. To identify the patients we used ICD-10 codes E10-E14. Two process indicators were collected: the percentage of patient with measured level of HbA1c (once a year) and the percentage of patient that have been referral to ophthalmologist for yearly fundus examination.

Results: Only one third of patient received opserved testing (25,9% in 2011, 34,4% in 2012 and 32,6% in 2013 for ophthalmology testing; 31,9% in 2011, 29,9% in 2012 and 32,9% in 2013 for laboratory testing).The percentage vary among health centres (from 3% to 100%). We identify problemes. Health centres didn't have the same information system with ability to extract needed reports. Some used data collected in paper. Doctors spent more time on administration, they missed to note patients.

Conclusion: Quality of care for patients with diabetes is insufficient. Electronic informational systems should be improved to support monitoring of quality indicators. Medical professionals should be informed about importance of valid and complete data collecting.

Key words: diabetes, quality, indicators, improvement, primary health care

2. SYSTEMATIC ASSESSMENT OF MODELING STUDIES FOR INFORMING HEALTH CARE DECISION MAKING IN SERBIAN HEALTHCARE SYSTEM

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Objectives: The objective of our study was to identify and analyze published full economic evaluations using decision-analytic models for various health interventions in Serbian healthcare system and make recommendations for the development of future models.

Materials and methods: We performed a systematic literature search in electronic databases (MEDLINE, ScienceDirect, Cochrane Database and NHS EED) to identify published studies in Serbian healthcare system using mathematical models. Required inclusion criteria were: clearly defined study population in relation to relevant clinical and patient-relevant health outcomes over a defined time horizon. Standardized forms for data extraction, description of study design, methodological framework, data sources for each model and quality assessment of studies were used.

Results: Six studies were included in the qualitative synthesis. Modeling approaches included decision trees, Markov cohort models and state-transition microsimulation models. Most models applied a lifetime horizon. All models identify and analyze in our assessment did not report on formal model validation.

Conclusions: Lack of sufficiently validation, by new recommendation, is a "fatal flaw" and results of such studies should not be trusted for informing health care decision making. There are no single modeling study appropriate for Informing health care decision making in Serbian healthcare system according to new recommendation.

Keywords: Modeling Studies, Economic Evaluations, Decision Making, Systematic Assessment, Health Technology Assessment.

3. INTEGRATED HEALTH INFORMATION SYSTEM (IHIS) AS A BASIS FOR THE DEVELOPMENT OF HEALTH STRATEGY

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Objectives: To describe the role of modern information technology in the development of local and national health strategies and experiences of the CPH-Bitola in the integration of a local information system with an national information system(2010-2014).

Material and methods: *Health information systems development* is looking for the knowledge of all the levels and structure of the health system. In the period 2010-2012, the Ministry of Health began IHIS project, was made the necessary legal framework and established a medical network in public health.

Results: In 2013 started implementation of the electronic health card (as a separate project of HIF) and “MY TERM” system for the electronic generation of instruction in all public health network. The integration of local information system with IHIS implied the possibility of horizontal and vertical application of HIS in managing resources at local and national level. IHIS benefits: accurate information about used recourses and delivered services. Key issues are: simplification of the low level interface, data validity and paper documentation, the bi-directional interfaces with the laboratory.

Conclusion: Development of IHIS and access to correct information at all health care levels is essential in resources management. Exploiting this information will result in timely response of the health system in the prevention and treatment.

Key words: health information system, integrated, data validity

4. PSYCHOSOCIAL RISK FACTORS IN CLINICAL-HOSPITAL HEALTH ACTIVITIES

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The aim of the work: Consideration of goal-psycho-social hazards or risk factors in clinical-hospital health activities that may produce poor mental and physical consequences.

Methodology of the work: Sectional study, conducted the study in which they used two standardized questionnaires:

1. COPSOQ - Questionnaire for the assessment of psychosocial factors in the work environment (National Centre for the Working Environment (NRCWE), Copenhagen, Denmark)

2. WAI - Questionnaire for the assessment of the Work Ability Index (Work Ability Index, National Institutes of Health and Safety at Work, Finland)

Included a total of 800 participants (400 physicians and 400 nurses) Clinical Center in Nis; 100 respondents (50 physicians and 50 nurses) of the General Hospital in Aleksinac and 50 patients (25 physicians and 25 nurses) Special hospital for nonspecific pulmonary diseases in Soko Banja.

Results: Of the basic characteristics of respondents, use of medications and lifestyles, multivariate regression analysis as the most important factors associated with the increase in the value of the IRS allocated: living in a household with parents that is associated with an increase in the value of the IRS to 0.433 (0.088 to 0.778, $p = 0.014$) , the use of painkillers rarely or never to 0.419 (0.196 to 0.641, $p <0.001$), and use of tranquilizers rarely or never to 0.279 (0.014 to 0.544, $p = 0.039$). The most important factors associated with the decline in the value of the IRS were: age 50 to 59 years, which is associated with impairment of IRS to 0.503 (0.270 to 0.737, $p <0.001$), age 60 and older to 0.925 (0.456 to 1.394, $p <0.001$), daily intake of painkillers to 0.947 (0.407 to 1.488, $p = 0.001$), use of tranquilizers one or more times per week to 0.627 (0.127 to 1.127, $p = 0.014$), daily intake of medication for insomnia for 0.939 (0.208 to 1.671, $p = 0.012$) and passive leisure activities, or less than 2 hours per week to 0.469 (0.242 to 0.696, $p <0.001$). Regression model containing the above 9 factors and constant regression explains 16.3% of variability values IRS (coefficient of determination $R2 = 0.163$).

The characteristics of jobs and scores COPSOQ questionnaire on domains, multivariate regression analysis as the most important factors that influence the value of the IRS allocated internship at the current workplace and scores: quantitative requirements, meaning work, obligations in the workplace, trust in leadership, health and samoprocenjenog stress.

Features that indicate the existence of violence and harassment in the workplace, multivariate regression analysis as the most important factors that influence the value of the IRS allocated to threats of violence by the subordinates and exposure to physical abuse by managers. These factors are associated with significant impairment of IRS and exposure to threats of violence by the subordinates of 0.944 (0.094 to 1.793, $p = 0.029$), and exposure to physical violence by the Head of 1.102 (0.046 to 2.158, $p = 0.041$). Regression model containing these two factors and constant regression explains only 1.1% of the variability of the value of IRS ($R2 = 0.011$). Of all the diseases and injuries multivariate regression analysis as the most important factors that influence the value of the IRS allocated: a leg injury / foot ishialgiju, disease of the lumbar spine, mild mental disorder, illness or injury to the eyes, high blood pressure and goiter and other thyroid diseases .

All three indicators of mental ability multivariate regression analysis confirmed its intent to be significant factors affecting the value of the IRS. These factors are associated with an increase in the value of the IRS, including: enjoying the daily activities of 0.330 (0.215 to 0.445, p <0.001), the activity and bustle of 0.146 (0.011 to 0.281, p = 0.034), and the fulfillment of the hope of the future for the 0,219 (0.121 to 0.317, p <0.001). Regression model containing these factors and constant regression explains 11.3% of variability values IRS (R2 = 0.113).

When in a regression model as independent variables included all factors in multivariate analyzes by blocks singled out as significant, the final model as the most important analyzed factors associated with the values IRS confirms age from 50 to 59 years, age 60 and over, taking painkillers every day, or passive leisure activities less than 2 hours per week, scores of quantitative demands, obligations at work, meaning work, samoprocenjenog health and stress, as well as the enjoyment of daily activities. Age 50 to 59 years is associated with a decline in the value of the IRS to 0.441 (0.224 to 0.657, p <0.001), and age 60 and older in 0,841 (0.408 to 1.274, p <0.001). Daily use of analgesics is associated with impairment of IRS 0.843 (0.372 to 1.315, p <0.001), and physical activity consisting of passive entertainment or activities that are less than 2 hours per week to 0.285 (0.073 to 0.496, p = 0.009). Enjoying the daily activities associated with the increase in the value of the IRS to 0.152 (0.046 to 0.257, p = 0.005). Any increase in the value of the scores of the following domains 1 was associated with a significant increase in the value of the IRS as follows: the meanings of work to 0.144 (0.078 to 0.210, p <0.001), the obligation to work for 0.068 (0.005 to 0.130, p = 0.035) and samoprocenjenog health of 0.369 (0.266 to 0.473, p <0.001). Any increase in the value of the scores of the following domains 1 was associated with a significant decline in the value of the IRS as follows: quantitative requirements for 0.125 (0.056 to 0.194, p <0.001), and the stress of 0.082 (0.020 to 0.145, p = 0.010). Regression model containing these factors and constant regression explains 27.6% of variability values IRS (R2 = 0.276).

Conclusion: Solving the problems of psychosocial factors in the workplace is a continuous process that requires firstly their familiarity. The practical significance of the study lies in interventions organizational character, which will be based on the research results, and motivating teams, manager of the health system to continuously monitor their establishments psychosocial factors in the workplace and work on their improvement, which would contribute to a better quality of life and increase the index working capacity of employees.

Key words: psycho-social risk factors, health stuff

5. MORBIDITY OF CARDIOVASCULAR DISEASE IN NIS AND TOPLICA COUNTY IN OCCUPATIONAL HEALTH SERVICES FROM 2000 TO 2012.

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Introduction: General and specific morbidity are medical-statistical indicators of the health status of the population (disease of) a certain area in a certain period of time stated in the rates of morbidity. The morbidity of heart disease and blood vessels indicates their frequency in the territory Nis and Toplica County in the period from 2000 to 2012.

Aim: Based on the monitored years to establish a growing tendency in the disease group I00-I99 ICD X morbidity in general medicine.

Method: The study of morbidity in Nis and Toplica County from 2000 to 2012 and in the interval of every three years under routine medical statistics.

Results: The rates of morbidity in Nis and Toplica County with occupational health services in general show a downward looking character that is particularly pronounced in Toplica. Such a decline was evident in both districts during the period from 2003 to 2006. Beginning in 2003, the rates of morbidity in diseases of the heart and blood vessels Nis County show a moderate decline, and as far as Toplica County Shire decline in mortality rates has a decreasing trend from 2000 to 2009 in the current year has been an increase and then returned decreasing character. Nis County had an increase from 2000 to 2003 and then was constantly moderate decline in overall morbidity of diseases of the heart and blood vessels.

Conclusion: It is to maintain a high level of preventive examinations of the economically active population, considering the prevalence of cardiovascular disease in recent years among the younger population. Emphasize the importance of healthy lifestyles and to isolate all the risk factors and their impact on the health of the economically active population from which the greater potential coverage.

Key words: Cardiovascular diseases, occupational medicine, Nis and Toplica County

6. USER SATISFACTION IN PRIMARY HEALTH CARE HEALTH OF CHILDREN IN NIS AND TOPLICA DISTRICTS IN 2013. YEAR.

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Introduction: Quality of care is evaluated in relation to the relevant indicators of quality of medical institutions. According to the Regulations on the verification of the quality of work of health institutions, health workers and associates internal quality checks are carried out on the basis of an annual program for monitoring the quality of work based on a survey of users.

Aim: The objective of the survey was to determine the degree of satisfaction with services provided in health facilities. The results of research are the basis for the planning of activities for the improvement of the quality of work in the future.

Methods: Patient satisfaction was conducted according to the methodology of the Ministry of Health of the Republic of Serbia, the questionnaires adopted and applied research in recent years. Respondents completed the questionnaires voluntarily and anonymously in order to implement the survey.

Results: Overall satisfaction of respondents in healthcare services for children in 2013, in terms of overall satisfaction with health care in this service, shows a high percentage share of 77.9% of users who were in the survey identified themselves as satisfied and very satisfied, also recorded a slight percentage decrease compared to the previous year when the overall satisfaction of the respondents in the services for the health care of children was 79.9%. Responses of other users are 20.1%, of which 5.4% were dissatisfied and very dissatisfied with health care services in the health care of children, while 16.7% of users gave a neutral response and formulated as neither satisfied nor dissatisfied.

Conclusion: It is an important fact in the health care of children not only a harmonious family environment, but also the work of doctors pediatricians, educators, psychologists, speech therapists and teachers themselves in the detection and elimination of potential health problems of the child in this developmental period.

Keywords: The quality of child health care, consumer health care, Nis and Toplica district

7. THE IMPACT OF SATISFACTION FACTORS ON OVERALL EMPLOYEE SATISFACTION IN HEALTH CARE INSTITUTIONS IN NIŠAVA AND TOPLICA DISTRICTS

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Introduction: Levels of needed quality in health care changes by time and assessment of quality of work in health facilities is dynamic process. The product of health system and its employees is health service whose quality is related to satisfaction and motivation of people working in health system. Satisfaction of the employee can be measured and can be assessed through the influence of different aspects of satisfaction: motivation, communication, organization, work conditions.

The objective of this study was to assess and compare satisfaction with different aspects of work as well its influence on complete satisfaction, among different categories of employees in health facilities on primary, secondary and tertiary level of health care in Nisava and Toplica districts.

Materials and methods: The study was conducted as one day study in 15 health facilities on primary level, 2 public hospitals and 27 clinics of Clinical Centre of Nis, using anonymous questionnaire. 3.892 emploees took part in this study, 2.227 from primary and 1.665 from secondary and tertiary level.

Results: Employees' satisfaction is presented through different factors of satisfaction: motivation, communication, organizational, structural. All employees on primary level are more satisfied with the majority of aspects of job comparing with employees on secondary and tertiary level of health care. Administrative staff is in general more satisfied with all aspects of job comparing with other categories of employees. All employees on secondary and tertiary level are more physically and psychically exhausted than employees on primary level of health care. Health staff on secondary and tertiary level is the most psychically exhausted.

Conclusion: There is difference in satisfaction with different aspects of job at different categories of employees, and on different levels of health, in health facilities on Nisava and Toplica districts. Employees in health facilities on primary level of health are in general more satisfied than employees on secondary and tertiary level of health. Different factors of satisfaction influence commplete satisfaction.

Key words: factors of satisfaction, employees, health facilities

8. AGE AND SEX DISTRIBUTION OF EMPLOYEES IN HEALTH INSTITUTIONS IN THE CITY OF NIS FROM 2003 TO 2013

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Introduction: Good strategy for the health system development, among other things, requires the planning of staff, employed in the health care system. For good planning it is necessary to know the structure of employees ranging from the missing branches of specialization to the age and sex structure of the existing staff.

The aim of the Study: Trend of employees movements in health facilities in Nis in the period 1985.-2013.; review of age and sex structure, as well some medical doctor's specializations in the period 2003-2013.

Source of data: Annual report on employees in health facilities in the period 1985.-2013

Results: In the end of 2013. There were 6575 employees in health facilities in Nis. In the group of health stuff there were 1359 (20.7%) (64 medical doctors +125 medical doctors on specialization +1170 specialists), dentists (151 2.3%), pharmacists (120 1.8%), nurses on different levels (420-6.3%; 2616 - 39.3%; 26 0.4%). In the group of nonmedical stuff were: co-workers (chemists 17 and other co-workers 101), nonmedical stuff 1765 (26.8%): administrative 1137 (135 VSS, 85 VS, 474 SS, 443 NS) and technical stuff 628. Medical doctors are one fifth of the stuff (17%-22%), nonmedical stuff has the trend of degrees, but not under 26%. Number of pharmacists and higher level nurses has the trend of increase, and biggest decrease has number of dentists. Dentists are the oldest among all health workers. Pharmacists and nurses on lower level are the youngest group of health workers, then nurses with the higher level of education. Age structure of some medical doctors is very unfavorable. Only the number of specialist of urgent medicine has the trend of increase, but from 2004, there are no younger than 35, and only 2 are younger than 45. Only 1 pathologists and gynecologist are younger than 35, and only 4 radiologists are younger than 45. There are no specialists younger from 35: for internal medicine from 2011, pediatricians from 2005., radiologists from 2005., anesthesiologists from 2008., ophthalmologists from 2009.

Conclusion: The worst situation is at pediatricians and radiologists were 80% are older than 45. Age structure of medical doctors is extremely unfavorable.

Key words: health stuff, age structure

POSTER PRESENTATIONS

9. HOSPITAL HEALTH CARE IN SOUTH BAČKA DISTRICT SINCE YEAR 2003 TO 2012

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Hospital health care on secondary and tertiary levels in South Bačka District has been provided by 7 healthcare facilities, during the period 2003 to 2012. The aim of this study was to analyze changes in functioning and utilization of stationary health care, and also in hospital beds capacity and workforce provision on District level, during the period of 10 years. This study was obtained using routine health statistics data collected by Public Health Institute of Vojvodina, national publications regarding health statistics in Serbia, and also international publications (WHO, OECD). The results showed that acute hospital bed capacity (4,71 on 1.000 inhabitants) is higher than legal acts require (3,30/1.000 inhabitants). Medical doctors provision is higher than Republic and Province averages, but at the same time lower than in other university centers in the country. During the observed decade, there was registered increase in: number of hospital days from 730.487 to 744.328 (+1,9%), number of hospitalizations for 21% (88.588 in 2012th), hospitalization rate from 12299,7 (per 100.000 inhabitants) in 2003th to 14400,1 in 2012th. At the same time, average length of stay shorted from initial 9,9 to 8,4 days, and bed occupancy grows up to 70,4% in 2012th (+1,3%), which means that stationary health care utilization on District level follows contemporary trends in this area.

Key words: hospital health care, South Bačka district, hospital beds and workforce provision, health care utilization

10. ANALYSIS OF THE SATISFACTION OF SUPPORT AND POSSIBLE HEALTH WORKERS TO WORK IN USED SOMEONE THE KNOWLEDGE AND SKILLS

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Public Health Institute, Niš

Introduction: Employee satisfaction is an integral part of quality in health care. Quality of health care depends on the manner in which the employees perform their work, which is, directly associated with their behavior, commitment, experience, and devotion. Basically everything is their motivation for work and quality work, as well as their satisfaction with the work they are doing. Their functioning within the health institution is not just tasks, but also achieve the standards of performance.

Materials and Methods: This study included 4,582 health and non-health workers employed in health care in Nisava and Toplica districts.

Results and discussion: The fact that (25.7%) of respondents are dissatisfied and very dissatisfied with the possibility of professional development, self-defeating in the field of vocational training, faster, higher quality and more innovative approach to business. The most dissatisfied with the medical staff to be voted (22.5%). When it comes to the possibility of the job using their knowledge and skills (16.8%) of these dissatisfied (24.6%) neither satisfied nor dissatisfied, and (44.7%) are satisfied and very satisfied, administrative workers very satisfied (64.6%) were satisfied and very satisfied, and .health workers (58.5%).

Conclusion: Employee satisfaction in health care is of particular attention because it has been associated with providing quality health care, patient satisfaction, and satisfaction with the outcome of treatment of professional development is of particular importance in view of the ever increasing levels of professional competence of employees by attending various training as internal and of External and continuous. This level of satisfaction with professional development is of paramount importance, given that for years have been conducting various activities in order to advance the knowledge and professionalism of health workers and associates.

Keywords: job satisfaction, quality of health care, health care institutions, knowledge, work skills

11. ANALYSIS OF RELATIONSHIP SATISFACTION BY SOCIAL COMMUNICATION AND CLOSE COOPERATION EMPLOYEES IN HEALTH CARE FACILITIES IN NISAVA AND TOPLICA DISTRICTS IN 2013.

Katarina Bulatović [1], Rangelov T.[1], Nikolić D.[1] i Ristić S.[1]

Public Health Institute, Niš

Abstract

Introduction: Employee satisfaction is an integral part of quality in health care. Quality of health care depends on the manner in which the employees perform their work, which is, directly associated with their behavior, commitment, experience, and devotion. Basically everything is their motivation for work and quality work, as well as their satisfaction with the work they are doing. Their functioning within the health institution is not just tasks, but also to communicate with colleagues, which greatly affects the quality of work.

Materials and Methods: This study included 4,582 health and non-health workers employed in health care in Nisava and Toplica districts.

Results and discussion: When it comes to interpersonal relationships, 48.5% of employees to identify themselves as satisfied and very satisfied, somewhat more than one-quarter, 23.4% were dissatisfied and very dissatisfied, while 28.0% "neither satisfied nor dissatisfied." Health care workers are most satisfied (49.0%), while the distribution disgruntled by all categories of employees is very similar. Direct collaboration with fellow employees are generally satisfied (64.5%) administrative workers (47.7%), health workers (48.5%), and health care assistants (40.1%) and technical workers (43.2 %).

Conclusion: This level of satisfaction with the direct cooperation with colleagues is of paramount importance, given that for years has been conducting various activities in order to promote teamwork, improve cooperation between health workers and associates. The fact that three thirds of employees to identify themselves as satisfied and very satisfied with the direct cooperation with colleagues is encouraging in terms of quality of work, quality of health services and the final effect.

Keywords: job satisfaction, quality of health care, health care institutions,

12. PATIENT SATISFACTION AS AN INDICATOR OF THE QUALITY OF HEALTH CARE IN CHILDREN HEALTH CARE SERVICES IN PRIMARY HEALTH CARE CENTERS IN NISAVA DISTRICT

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Abstract

Introduction: The quality of health care is considered a priority in the context of well-being of a patient as an individual, the population and the potential of one country. It is a dynamic process because levels of required quality change over time. The aim is to increase the effectiveness and efficiency while ensuring a certain level of equity in the provision of health services.

The Aim: The aim of this study is to assess the level of patient satisfaction with health care provided in Children Health Care Services in Primary Health Care Centers in Nisava districts.

Materials and Methods: A cross sectional study of children health care was conducted in 10 Primary Health Centers in Nisava region in 2013. 1,043 out of 1,150 patients took the questionnaire to fill out, and 992 questionnaires were completed and returned (response rate 95.10%). The study used an anonymous survey defined by the Republic Committee for Quality, the Ministry of Health of the Republic of Serbia.

Results and discussion: In relation to the total satisfaction, 79.5% of patients declared as satisfied or very satisfied. The highest percentage of patients (77.9%) had selected their pediatricians and this study confirms that the awareness of the existence of selected pediatricians is greater than in previous years.

Conclusion: More than three quarters of surveyed patients declared as satisfied or very satisfied with the work of the Department of Pediatrics in Health care centers in Nisava region. The awareness of the existence of selected pediatricians is far greater than in previous years and all the surveyed patients have a selected pediatrician (the greater percentage has selected their pediatrician themselves).

Key words: health care quality, primary health care, pediatric services, health care centers

SESSION: CURRENT PARASITOSIS

INVITED LECTURES

1. HUMAN ECHINOCOCCOSIS: EPIDEMIOLOGICAL AND SERODIAGNOSTIC ASPECTS

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Abstract

Echinococcosis (hydatid disease, HD; cystic echinococcosis, CE) is a global parasitic disease, the incidence and prevalence of which have been markedly reduced in recent decades. Although it is an ancient disease, it is regretfully still a current public health problem in many countries worldwide, even in the regions where the implementation of disease surveillance and control has been successful. The highest prevalence of CE has been observed in the countries with moderate climates. Geographical distribution of CE is variable throughout Serbia, and the territory of Niš municipality is a region with high seroincidence and seroprevalence of this parasitic disease. Numerous methods of molecular biology have made possible the genotyping and identification of *Echinococcus spp*. strains, which may contribute to a deeper insight into the epidemiological scenarios in individual regions. The most common strain in the world, associated with human CE, is the sheep strain (G1). There are numerous direct and indirect, and invasive and non-invasive methods in the diagnosis of CE. Imaging methods are suitable for the purposes of screening and detection of new cases of the disease, while the tests for detection of specific serum antibodies are suitable for serodiagnosis of CE.

Key words: hydatid disease, epidemiology, serodiagnosis

Introduction

Echinococcosis is a zoonotic infection caused by the adult form or larva of the cestode that belongs to the Echinococcus genus of the family Taeniidae. It is a public health issue throughout the world, in spite of the measures of prevention and infection control. There are four morphologically and biologically different strains relevant for public health: *Echinococcus granulosus* (*E. granulosus*) (Batsch, 1786), the cause of cystic echinococcosis (CE); *E. multilocularis* (Leuckart, 1863), the cause of alveolar echinococcosis (AE); *E. oligarthrus* (Diesing, 1863); and *E. vogeli* (Rausch and Bernstein, 1972), the cause of polycystic echinococcosis (PE). In some small mammals (*E. shiquicus*) in the Tibetan Plateau and in African lions (*E. felidis*), new parasitic strains have been identified, with an insufficiently understood zoonotic potential (1). In recent years, numerous molecular techniques have become available, enabling the identification of certain *Echinococcus spp*.

strains, which may contribute to a deeper insight into the epidemiological scenarios in particular regions (2, 3, 4, 5).

Cystic echinococcosis and AC are geographically widely distributed; they can cause fatal disease in humans and, in addition to the medical aspects, they present a huge economic problem (1, 2, 4).

Life cycle of the parasites involves two hosts. The adult cestode inhabits the small bowel of carnivores (the final host) and produces eggs containing infectious oncospheres. The eggs and/or proglottids are excreted via feces. After an oral intake of eggs/proglottids, metacestodes (larva stage) develop in the intermediate (secondary) host. An adult metacestode produces numerous protoscolexes which may develop into adult cestode if there is an intake by the appropriate primary host (1, 2, 3).

Cestode eggs contain the embryo, hexacanth, able to survive from six months to a year in the external environment. Echinococcal (hydatid) cysts represent the larval forms which develop in the secondary host (most commonly sheep, cattle, goats, horse, pig, and rarely men) (6).

Humans are random (aberrant), secondary host to the larval stage of *E. granulosus* (dog tapeworm) which causes the disease termed echinococcosis, hydatid disease (HD), or cystic echinococcosis (CE). Cysts may form in various tissues after the ingestion of *E. granulosis* eggs. This form of echinococcosis is termed primary CE. Secondary CE (mostly localized in the abdominal cavity) is the result of spontaneous or trauma-induced cyst rupture and release of protoscolexes and/or small cysts that can grow into large cysts. On the average, 40-80% of patients with primary CE have single organ involvement and a solitary cyst (2, 3). In men, cysts are commonly localized in the liver (60%), lungs (about 20%), and rarely in the spleen, brain, and bones (4, 5, 6).

When a men, as a secondary host, ingests the eggs, the hexacanth embryo casts away its membrane and actively penetrates the mucosa and bowel wall till it enters the lumen of a blood or lymph vessel. It reaches the liver via bloodstream, where it commonly stays for longer and transforms into a hydatidigenic cyst. The transformation progresses slowly, about 1 cm in diameter in several months (about 5 months). The cyst stays alive for years. The cases of 10 to 20 years old cysts have been reported. The embryo, if it does not stay in the liver, can reach the lungs. If it passes the lung barrier, reaching systemic circulation, it is able to colonize any organ or tissue (1-6).

The initial phase of primary infection is always asymptomatic. Small, well incapsulated, non-progressive or calcified cysts usually do not cause complaints and patients continue living without any clinical manifestation of CE for years or for life (3). Disease development depends on the number, size and degree of development of the cyst(s) (being active or inactive ones), compression of the adjacent tissues and structures, and defence mechanisms of the host. The degree of growth of these cysts may vary depending on the involved organ and also on the region in the world the infected person is from (7, 8, 9). Ultrasound studies in the South America have demonstrated that the average cyst diameter in persons with asymptomatic echinococcosis is smaller (4 cm on the average) than in those with manifest, symptomatic disease (about 10 cm) (9). Clinical manifestations of echinococcosis can become evident after a very variable incubation period, from several months to several years (9, 10, 11).

Alveolar echinococcosis (AE) is a parasitic infection caused by *E. multilocularis* strain in the metacestode phase, which resembles an infiltrative and destructive tumor with a potential to induce serious, highly fatal disease (1-3). After the ingestion of *E. multilocularis* eggs, metacestodes develop almost exclusively in the liver. The size of these lesions in the liver is

very variable, from a small focus of several millimeters, to large infiltration zones from 15 to 20 cm in diameter. Primary extrahepatic sites of *E. multilocularis* metacestode are extremely rare. From the liver, metacestodes spread via lymph or blood vessels to adjacent or distant organs, forming the infiltrations or metastases there (1-3). It has been believed for long that *E. multilocularis* metacestodes maintain an unlimited proliferative capacity till the patient death. However, under the influence of host defence mechanisms, metacestodes may become calcified and die. Spontaneous healing of AE is therefore possible, but the frequency of such an outcome is not known (3).

In one third of the affected, clinical manifestations of AE are not specific enough (fatigue, loss of weight, hepatomegaly, abnormal values of routine laboratory parameters usually occur) and in two thirds cholestatic jaundice and/or epigastric pain may be encountered (3).

The diagnosis of AE is based on the similar criteria and findings as in CE (patient history, clinical findings, morphological liver findings detected by imaging techniques, immunodiagnostic tests) (1-3).

Epidemiology of human echinococcosis

Worldwide incidence of human echinococcosis is between 1 and 200 per 100.000 inhabitants (1-4). Cystic echinococcosis in animals and humans prevails in the countries with the moderate climate, and in the south of South America, in the Mediterranean, southern and central parts of the ex-Soviet Union, in central Asia, China, Australia, parts of Africa, but it is also present in the regions with colder climates. In North America, from arctic Alaska approximately to the northern border of the United States, two natural cycles involve the wolf and wild reindeer and wolf and elk (moose) (1-4). The prevalence of human CE is highest in those involved in sheep farming (2). The diagnose of echinococcosis in the USA is most common in immigrant populations from the countries where the disease is endemic. Sporadically, autochthonous transmission has been reported in Alaska, California, Utah, Arisona, New Mexico (1, 2, 3). CE occurs in all age groups, even in those below one year of age and those over 75, and in both genders. In certain regions endemic for echinococcosis, most hospitalized cases belong to the age group from 21 to 40 years, but the highest disease rate is reported in younger persons aged 6 to 20 years (3). The distribution of patient occupation may vary from country to country, depending on the epidemiological and socioeconomic circumstances (2).

In Europe, the incidence of echinococcosis ranges from 1 to 8 per 100.000 inhabitants, except for the countries of northern and central Europe and the Carribean, where echinococcosis is sporadical and/or is not reported at all. In Iceland and Greenland there is no echinococcosis, and New Zealand, Tasmania, southern Cyprus are „provisionally free“ of the infection (2, 3, 14, 15, 16). Geographical characteristics of island countries have contributed to the control and suppression programs to be markedly more successful compared to other areas (1-3).

The infection with *E. granulosis* is endemic and/or hyperendemic in most countries in the region. A study undertaken in six regions in Italy has shown a wide variability of infection rates in sheep (11-87%) (3). In Sardinia, the highest prevalence of echinococcosis in dogs and sheep was reported, while the yearly prevalence of human CE was 8.0 per 100.000 in 1990. The average incidence in the whole country for the period 1980-1984 was 1.92 per 100.000 inhabitants, ranging from 0.46 to 10.1, depending on the region (3).

In recent years, echinococcosis as an endemic/hyperendemic infection has been documented in many of the Balkan countries (the territory of former Yugoslavia, Romania, Bulgaria, Greece) (3, 16, 17). Due to a worse socioeconomic situation and cessation of control

programs for echinococcosis in Bulgaria, the rates of this parasitic disease are on the rise again in both animal and human populations. In the period from 1971 to 1995, in dogs and sheep, the rates of incidence of echinococcosis per year rose, as well as the average yearly number of surgical interventions (both new and repeated ones) for human CE throughout the country (from 176 to 291) (3). In 1995, the average incidence rate by the districts ranged from 1.9 to 15.8 per 100.000, being highly endemic especially in southern parts of Bulgaria (3, 17). In the period 2001-2010, incidence rates ranged from 3.88 to 9.27 per 100.000 (18). In contrast to Bulgaria, Hungary is the country with lowest yearly incidence of echinococcosis (0.05-0.13). After a long period in which there were no information about echinococcosis in Albania, some recent data have shown extremely high values of the infection incidence (5.27 cases per 100.000) (18). The study by Calma et al. detected a yearly incidence rate of echinococcosis of 3.8 cases per 100.000 in western Romania in the period 2004-2010 (19). In Greece, the prevalence of CE in domestic animals ranged very widely (from 82% to 56.6% in cattle; 80% and 100% in sheep; 24% and 15.4% in goats; and 5% and 9.3% in pigs) from the middle 1980s to middle 1990s. The proportion of human CE in surgical cases dramatically rose, from 12.9 per 100.000 inhabitants in 1984 to 29% in 1999 (16). In Greece, after a veterinary surveillance undertaken near the end of the 20th century, the prevalence of echinococcosis in cattle was reduced (i.e. there were no reports of HD in cattle) (16), while a recent study in central Greece revealed the incidence rate of 39.3% in sheep (20). In humans, the total incidence rate has been on the rise in recent years (being even as high as 12.7 per 100.000 inhabitants); some recent studies have documented a significant drop of incidence rates (0.122 per 100.000 inhabitants), which does not agree with a large number of cases of human CE diagnosed yearly in surgery departments (and almost half of the affected are surgically managed) (4).

In the territory of former Yugoslavia, echinococcosis was the leading infectious parasitosis. More recent data for the period 2001-2010 demonstrated the following values of incidence of echinococcosis: Former Yugoslav Republic of Macedonia, 0.3-1.89; Bosnia and Herzegowina, 0.32-1.06; Croatia, 0.23-0.81 and Slovenia 0.005-0.4 (18).

Geographical distribution of CE is diverse in Serbia. The cummulative incidence of reported cases in the period 2001-2010 ranged from 0.46 per 100.000 in the central part of the country, to 39.0 cases per 100.000 in the south of Serbia. In the territory of Belgrade, the cummulative incidence was low (1.3 cases per 100.000 inhabitants in the period). The results of the analysis by Bobić et al. demonstrated that women were more commonly infected compared to men, especially those over 40 years of age, while the affected individuals most commonly inhabited rural regions (21).

In the territory of the Niš municipality, in the period 1988-2000, the seroincidence of echinococcosis was significantly high, ranging from 2.02 to 10.86 per 100.000 inhabitants (22). The results of the last study showed that the Niš municipality was an area with exceptionally high seroincidence and seroprevalence rates of echinococcosis (23). The cummulative seroincidence of SE was 10.79 per 100.000 in the period 1988-2010. In the period 1988-1998, the seroprevalence of CE was 25.4%, and the introduction of new serological tests elevated the percentage of prevalence to 33.0% (23).

Based on the data of the laboratory for immunodiagnosis of parasitic and fungal infections in the Center of Microbiology in Niš, the cummulative incidence rate of echinococcosis in the last three years (2011-2013) was 19.01 per 100.000 inhabitants, with average yearly disease rate of 6.33. In the analyzed period, the values of incidence rates ranged as follows: 5.89 in 2011; 7.76 in 2012; and 5.35 per 100.000 inhabitants in 2013. In the analyzed period, the seroprevalence values were markedly lower (14.5%), ranging from 12% to 20%. In the

serological diagnosis of echinococcosis, in addition to the primary tests to detect specific IgG antibodies against *E. granulosus* in the patient sera, a secondary, confirmatory immunoblot test (Western Blot, WB) was utilized, enabling the confirmation and differentiation of *E. granulosus/E. multilocularis* strains, leading to a reduction of prevalence of echinococcosis in the territory of Niš municipality in the observed period.

Methods of molecular biology have made possible the genotyping of *E. granulosus* and identification of 10 genotypes (G1-10): G1 and G2 sheep strains; G3 and G5 bovid strains; G4 a horse strain; G6 a camelid strain; G7 a pig strain and G8 in wolves, dogs, mooses and elks in the northern parts of North America and Euroasia, the so called cervid or northern sylvatic genotype (a cervid strain). G9 genotype has been described in pigs in Poland, and G10 in elks in Eurasia. The sheep strain (G1) is the most common genotype worldwide and most commonly associated with human infection (3-5). In Serbia, by way of genotyping, the presence of *E. granulosus sensu stricto* G1 and *E. canadensis* G7 has been confirmed in humans (24).

Variable geographical distribution of *E. granulosus* genotypes exists in different hosts, with some major public health implications. A shorter maturation period of adult parasite forms in the gut of the dog indicates that the interval of administration of antiparasitic agents to infected animals has to be shortened in the regions with G2, G5, and G6 genotypes (3-5).

A widely present practice of feeding dogs with sheep entrails in households facilitates the transmission of sheep genotypes and increases the risk of human infection (1-3). The dogs infected with *E. granulosus* excrete the eggs via feces, and humans can be infected via contact, especially children in their play with dogs. Eggs accumulate around the anus of an infected dog, and can be also found on the hips and paws. Indirect transmission of eggs, via contaminated water, uncooked food, flies and arthropodes, as the consequence of poor mnagement of waste materials and lack of analyses in wild animals, can also lead to human infection (1-3).

Alveolar echinococcosis is present in the northern hemisphere, with endemic regions being central Europe, northern and central Eurasia, parts of North America, and certain regions of northern Africa (Tunisia) (3).

The first case of human AE was reported in Germany in 1852 (2, 3). In central Europe, till the end of the 1980s, endemic regions were reported in four countries (Austria, France, Germany, Switzerland). More recent data indicate that the geographical distribution of AE extends to another 12 countries (2, 3). A new focus of AE was identified in 1999 on the Svalbard islands in Norway (3). In central European countries, the prevalence of *E. multilocularis* in red foxes varies from <1% to >60%. There are signs of an increase in risk factors for this parasitic disease (an increased prevalence of the parasite in foxes, growth of population of foxes and their progressive expansion to urban areas after reduced incidence of rabies as the result of successful *per os* vaccination) (2, 3). In Serbia, the first case of *E. multilocularis* in the European beaver has been recently reported (25).

In the Mediterranean region, human cases of AE have been reported in Turkey and Iran. *E. multilocularis* is endemic in large portions of the Russian Federation and neighbouring countries. In the People's Republic of China, *E. multilocularis* is mainly distributed in the western and central parts of the country. In Japan, *E. multilocularis* is endemic in Hokkaido, while in North America it is present in the Alaskan and Canadian northern barren grounds (tundra), in the south of the northern central region of the USA, including the parts of three Canadian provinces, and also in thirteen other states of the USA. Most human cases of AE

have been reported in the northern zone, and only two cases in the northern central USA (1-4).

At the time of diagnosis, the patients with AE are mostly older adults of both genders. In Europe, the age of AE cases ranges from 10 to 89 years, peaking in the age group 50-70 years (3).

E. vogeli and *E. oligarthrus*, the causes of human PE, are endemic in Central and South America. To date, at least 96 human cases of PE have been diagnosed in the area from Nicaragua in the north, to Chile, Argentina and Uruguay in the south (3).

Immunodiagnosis of human echinococcosis

In most cases, the diagnosis of echinococcosis can be made by the detection of characteristic structures and size of *Echinococcus spp.* cyst(s) using different imaging techniques, primarily by ultrasound (US) (1-5). The technique is suitable for screening purposes and detection of new cases of echinococcosis. Portable US machines have been used in recent years, since they can be easily transported and used in verious environments (3, 26). Nowadays, there are numerous direct and indirect methods, both invasive and non-invasive, and it is very important to select the simplest and cheapest methods, with as few as possible adverse effects, being most efficient at the same time. A group of experts for echinococcosis has presented some general recommendations for the diagnosis of this parasitic disease (3).

Immunodiagnostic methods intended to detect specific antibodies to *Echinococcus spp.* antigens in the serum make possible the diagnosis of echinococcosis in patients observed and/or differential diagnosis in cases with unspecific findings yielded by the imaging techniques. The results of immunodiagnostic methods also make possible the epidemiological surveillance of echinococcosis, being of utmost importance in the prevention and control of the disease.

In clinical practice, tests to detect specific antibodies in the serum have special significance in immunodiagnosis of echinococcosis. However, in some patients with echinococcosis, in spite of high values of sensitivity of the above tests, false negative results can be encountered. A low titer of antibodies and/or their absence can occur if echinococcus cysts are anatomically situated in the brain or eye, as well as in calcified echinococcal cysts, regardless of the anatomical site. Antibody response can be weak in some population groups and in infants. In contrast, false positive results can occur in patients with some other helminthic infections (3, 5).

Out of serological tests to detect echinococcal antibodies in the serum of patients suspected to have CE, primary and secondary tests are recommended (3, 5). The usage of several primary tests (the enzyme-linked immunosorbent assay for detecting of IgG, IgG-ELISA; the indirect hemagglutination antibody test, IHAT; latex agglutination test, LAT are commonly used in laboratories and less frequently, immunofluorescence antibody test, IFAT; immunoelectrophoresis, IEP and some other tests) can increase the method sensitivity. Positive serology obtained by a primary test should be confirmed using a secondary serological test (2, 3).

Many laboratories use at least two different primary tests for routine diagnosis of CE, since the results of serological tests depend on a multitude of factors (test quality, training of the personnel, organ involvement, number of hydatid cysts, individual patient reactivity, and so on) with a possible impact on test sensitivity. Regretfully, there is no standard, highly sensitive and specific serological test to detect antibodies in human CE cases (3, 5).

In recent years, several secondary test systems have been used in specialized laboratories (double diffusion method, identification of IgG subclass, immunoblotting, indicating the reactivity of serum antibodies with subunits of *E. granulosus* antigens). These tests are less sensitive but more specific than primary test systems (1-3).

The tests of IgG antibodies against *E. granulosus* antigens are less important in the assessment of treatment results (surgery and/or chemotherapy), in contrast to IgG subclass analysis, which is superior in demonstrating the qualitative changes of parameters in the serum (3).

Early diagnosis of AE is considered to be a precondition for an effective treatment of the affected people (101). Population screening for AE in the endemic regions of Japan and Europe have clearly shown that early diagnosis can reduce both morbidity and mortality, as well as treatment related costs. AE diagnosis is based on the findings and criteria similar to those in CE. Serological tests intended to detect serum antibodies are more reliable in AE diagnosis than in CE diagnosis. In immunodiagnosis of human AE, out of the primary ones, two types of tests to detect antibodies (IgG) are used. The first, type A tests are highly sensitive and specific, and use purified *E. multilocularis* antigens (Em2-antigen, the Em18-antigen, the Emalkaline phosphatase-antigen, the C-antigen) or the recombinant antigens II/3-10 and Em10. The second, type B tests are less sensitive and specific and use raw *E. granulosus* or *E. multilocularis* antigens. In everyday practice, type A tests should be preferred as primary tests because of diagnostic sensitivity ranging from 90% to 100% (1-5).

Similar to the immunodiagnosis of CE, secondary tests (an enzyme immune test with *E. multilocularis* protoscolex-antigen, IgG4 determination in ELISA, Western blot analysis) can be used to evaluate the results of basic tests in AE immunodiagnosis, as well as in the exclusion of cross reactivity in a positive serum (3). A Western blot test has been made available commercially (Echinococcus WB IgG, LDBIO Diagnostics, Lyons, France) and enables discrimination between AE and CE with a reliability of approximately 76% (1-5, 11, 28). Serological tests have limited value in the evaluation of effectivity of surgical and chemotherapeutic treatment of AE, as well as the viability of *E. multilocularis* metacestode (1-5).

Conclusion and prospects

Literature data show that human echinococcosis is still a huge public health burden in many countries worldwide. Studies have so far demonstrated that the territory of the Niš municipality is endemic for echinococcosis, which is still a large public health issue. The indicants of rising health risks to humans regarding this parasitic disease are alarming. A globally coordinated health surveillance system and assessment of risks for contracting this parasitic disease is a task for the international community as a whole, as well as continued surveillance and improvement of control and measures of prevention of echinococcosis.

References

1. Moro P., Schantz PM. Echinococcosis: a review. International Journal of Infectious Diseases 2009; 13: 125-133.
2. Eckert J. and Deplazes P. Biological, Epidemiological, and Clinical Aspects of Echinococcosis, a Zoonosis of Increasing Concern. Clinical Microbiology Reviews, 2004; 17 (1):107-135.
3. Pawlowski, Z. S., J. Eckert, D. A. Vuitton, R. W. Ammann, P. Kern, P. S. Craig, F. K. Dar, F. De Rosa, C. Filice, B. Gottstein, F. Grimm, C. N. L. Macpherson, N. Sato, T. Todorov, J. Uchino, W. von Sinner, and H. Wen. 2001. Echinococcosis in humans: clinical aspects, diagnosis and treatment, p. 20–66. *In* J. Eckert, M. A. Gemmell, F.-X.

Meslin, and Z. S. Pawlowski (ed.), WHO/OIE manual on echinococcosis in humans and animals: a public health problem of global concern. World Organisation for Animal Health, Paris, France.
4. Grosso G, et. al. Worldwide epidemiology of liver hydatidosis including the Mediterranean area. World J Gastroenterol 2012; 18(13): 1425-1437.
5. McManus DP, Gray DJ, Zhang W, Yang Y. Diagnosis, treatment, and management of echinococcosis. BMJ 2012; 344 doi: http://dx.doi.org/10.1136/bmj.e3866
6. Otašević S., Miladinović Tasić N., Tasić A. Medicinska parazitologija sa CD-om, udžbenik, Medicinski fakultet u Nišu&Galaksija, Niš, 2011: 127-132.
7. Jawetz, Melnick, Adelberg's Medical microbiology, XXIIIth ed, Brooks BF, Butel JS, Morse SA. Eds McGraw-Hill Medical, USA 2004: 591-592.
8. Eckert J, Echinococcosis: an emeging and re-emerging zoonosis. WHO Mediterranean Zoonoses Control Centre Information Circular 2001; 53:13-15.
9. Larrieu, E. J., and B. Frider**.** Human cystic echinococcosis: contributions to the natural history of the disease. Ann. Trop. Med. Parasitol. 2001; 95:679–687.
10. Vuitton, D. A., V. Godot, S. Zhang, S. Harraga, A. Penfornis, I. Beurton, B. Gottstein, P. Kern, and the Euechinoreg Network. 2002. Host immunogenetics and role in epidemiolgy of larval cestodes, p. 183–194. *In* P. Craig and Z. Pawlowski (ed.), Cestode zoononoses: echinococcosis and cysticercosis, an emergent and global problem. IOS Press, Amsterdam, The Netherlands.
11. Gottstein, B. 2000. Immunodiagnosis of infections with cestodes, p. 347–373. *In* Y. H. Hui, S. A. Sattar, K. D. Murrell, W.-K. Nip, and P. S. Stanfield (ed.), Foodborne disease handbook. Marcel Dekker, Inc., New York, N.Y.
12. Yang Y. R., Sun T., Li Z., Zhang J., Teng J., Liu X., et al. Community surveys and risk factor analysis of human alveolar and cystic echinococcosis in Ningxia Hui Autonomous Region, China. Bull World Health Organ 2006; 84:714-21.
13. Moro PL., Schantz P. M. Echinococcosis: historical landmarks and progress in research and control. Ann Trop Med Parasitol 2006; 100:703-14.
14. Romig T., Dinkel A., Mackenstedt U. The present situation of echinococcosis in Europe. Parasitol Int 2006; 55:S187-91.
15. McManus D. P., Zhang W., Li J., Bartley P. B. Echinococcosis. The Lancet 2003; 362: 1295-1304.
16. Sotiraki S., Himonas C., Korkoliakou P. Hydatidosis-echinococcosis in Greece. Acta Tropica 2003; 85:197-201.
17. Todorov T., Boeva V. Human echinococcosis in Bulgaria: a comparative epidemiological analysis. Bulleten of the World Health Organisation 1999; 77:110-118.
18. WHO/Europe, World Health Organization-Europe. Centralized Information System for Infectious Diseases (CISID) 1998-2010. Available at: http://data.euro.who.int/CISID/
19. Calma CL, Neghina AM, Vlaicu B, Neghina R. Cystic echinococcosis in the human population of a western Romanian county, 2004–2010. Clin Microbiol Infect 2011; 17:1731–1734.
20. Christodoulopoulos G, Theodoropoulos G, Petrakos G. Epidemiological survey of cestode-larva disease in Greek sheep flocks. *Vet Parasitol* 2008; 153: 368-373.
21. Branko Bobic, Aleksandra Nikolic, Sofija Katic Radivojevic, Ivana Klun, and Olgica Djurkovic-Djakovic. Echinococcosis in Serbia: An Issue for the 21st Century? Foodborne patogens and disease, 2012; 11(9): 967-973.
22. Miladinović-Tasić N., Tasić S., Petrović B., Tasić A. Echinococcosis in Nis region. Book of abstracts of II congress of the physicians of the Macedonian preventive medicine, Ohrid 2002: 396.

23. Otašević S., Miladinović Tasić N., Tasić A., Zdravković A., Đorđević J., Ignjatović A., Marković R., Cvetković D. Seroincidence of Echinococcosis at the Territory of the City of Niš. Acta Facultatis Medicae Naissensis 2010; 27(4):199-204.
24. Čolović I. Morfološke i genetske osobine sojeva *Echinoccosus granulosus* od bolesnika sa cističnom hidatidozom jetre [Morphological and genetic characteristics of *Echinococcus granulosus* strains from patients with cystic liver hydatidosis][Ph.D. dissertation]. School of Medicine, University of Belgrade, 2009. (In Croatian).
25. Ćirović D., Pavlović I., Kulišić Z., Ivetić V., Penezić A. and Cosić N. Short Communications: *Echinococcus multilocularis*in the European beaver (*Castor fibre* L.) from Serbia: first report. Veterinary Record 2012; 171:100 doi:10.1136/vr.100879
26. World Health Organization. International classification of ultrasound images in cystic echinococcosis for application in clinical and field epidemiological settings. Acta Trop 2003; 85:253-61.
27. Dreweck C. M., Lüder C. G. K., Sobaslay P. T., Kern P. Subclass-specific serological reactivity and IgG_4-specific antigen recognition in human echinococcosis. Trop. Med. Int. Health 1997; 2:779–787.

2. RADIOLOŠKA DIJAGNOSTIKA I INTERVENTNE RADIOLOŠKE METODE U LEČENJU EHINOKOKUSA JETRE

2. RADIOLOGICAL DIAGNOSIS AND INTERVENTIONAL RADIOLOGICAL PROCEDURES IN TREATMENT OF HEPATIC HYDATID CYSTS

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Introduction: Ultrasound examination is the first choice in radiological diagnostics of hepatic hydatid disease presenting with different ultrasound appearences of the cysts and the possibility of classification into six groups (WHO IWGR, 2001). Multi-detector computed tomography (MDCT) and magnetic resonance imaging (MRI) play a major role in diagnosing complicated cases, and especially in the diagnosis of postoperative recurrences.

Method: In the past, surgery was the only acceptable therapeutic approach in treatment of cystic hydatid disease of the liver. Percutaneous treatment (PAIR - puncture, aspiration, injection and reaspiration) has long been contraindicated because of possible complications, such as spillage, dissemination and anaphylactic shock. Numerous studies have not proven these claims. The indications for PAIR are multiple cysts, existing contraindications for surgical treatment, pregnancy and relapses following surgical procedures. Percutaneous treatment is often combined with prophylaxis by albendazole.

Results: The success of percutaneous treatment for uncomplicated cysts ranges up to 88 % with a small number of recurrences, up to 10 %, and an average treatment duration of four days.

Conclusion: Ultrasound examination is the method of choice in diagnosis and monitoring of patients after percutaneous treatment of cystic hydatid disease. PAIR is a successful alternative to surgical treatment due to the shorter duration of procedure, lower morbidity and insignificant number of complications.

Key words: radiological diagnosis, PAIR, cystic hydatid disease

3. SURGICAL STRATEGIES AND TACTICS IN LIVER ECHINOCOCCIS TREATMENT

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4. THERAPEUTIC STRATEGIES AND TACTICS IN ECHINOCOCCIS

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ORAL PRESENTATION

1. EHINOKOKOZA U SRBIJI DANAS

1. CURRENT STATUS OF ECHINOCOCCOSIS IN SERBIA

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Objectives: In Serbia, echinococcosis (CE) is mandatory reportable. We review the officially reports as well as the research data published between 1998 and 2012.

Materials: Official data on human and animal infections were obtained from the Reports on Infectious Diseases in Serbia, the Statistical Office and the Ministry of Agriculture. Published data were obtained by searching the Medline, Scopus and Google databases using “echinococcosis”, “hydatidosis” and “Serbia” as keywords. In addition, the search included national journals, doctoral thesesand conference proceedings.

Results: Inhumans only *Echinococcus granulosus* has been reported, with a total of 481 cases officially reportedbetween 1998 and 2012. Up to 2010, 409 cases wereofficially reported as opposed to 851 cases described in clinical studies. No trend in the incidence of infection was shown among adults, but the number of cases in children decreased over the period. Infections were more frequent in females (67%). A lower incidence of CE was noted in the central part of country. Among domestic animals asharp decrease in the CE prevalence was registered (from 14 to1% in sheep, 13 to 2% in cattle, 9 to 4% in swine).

Conclusion: In Serbia,echinococcosis remains endemic butis currently not a re-emerging infection.

Key words: Echinnococcosis, Serbia, epidemiological data

2. PROMOTION OF THE HERACLES FP7 PROJECT ON ECHINOCOCCOSIS

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HEALTH PROMOTION SESSION

INTODUCTORY PRESENTATIONS:

1. HEALTHY CITY NOVI SAD – HEALTH PROMOTION AND DISEASE PREVENTION PROGRAMMES

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A healthy city is one that continually creates and improves its physical and social environments and expands the community resources that enable people to mutually support each other in performing all the functions of life and developing to their maximum potential.
A healthy city is defined by a process, not an outcome. A healthy city is not one that has achieved a particular health status. It is conscious of health and striving to improve it. Thus any city can be a healthy city, regardless of its current health status. The requirements are: a commitment to health and a process and structure to achieve it. WHO/Europe recommends a basic model for a healthy city.
The WHO European Healthy Cities Network consists of cities around the WHO European Region that are committed to health and sustainable development: nearly 100 cities and towns from 30 countries. They are also linked through national, regional, metropolitan and thematic healthy cities networks. A city joins the WHO European Healthy Cities Network based on criteria that are renewed every five years.
Each five-year phase focuses on core priority themes and is launched with a political declaration and a set of strategic goals. The overarching goal of the current Phase VI (2014–2018) is implementing Health 2020 at the local level.
The following two strategic goals of Health 2020 provide the overarching umbrella of Phase VI:

- improving health for all and reducing health inequities; and
- improving leadership and participatory governance for health

Both strategic goals reinforce the strong standing commitment of the WHO European Network to addressing equity and the social determinants of health and striving to improve governance for health and promote health in all policies.
Healthy Cities approach seeks to put health high on the political and social agenda of cities and to build a strong movement for public health at the local level. It strongly emphasizes equity, participatory governance and solidarity, inter-sector collaboration and action to address the determinants of health.
Successful implementation of this approach requires innovative action addressing all aspects of health and living conditions, and extensive networking between cities across Europe and beyond. This entails explicit political commitment, leadership, institutional change and intersectoral partnerships.
The Healthy Cities approach recognizes the determinants of health and the need to work in collaboration across public, private, voluntary and community sector organizations. This way of working and thinking includes involving local people in decision-making, requires political

commitment and organizational and community development, and recognizes the process to be as important as the outcomes.

The WHO European Healthy Cities Network has six strategic goals:

1. to promote policies and action for health and sustainable development at the local level and across the WHO European Region, with an emphasis on the determinants of health, people living in poverty and the needs of vulnerable groups;
2. to strengthen the national standing of Healthy Cities in the context of policies for health development, public health and urban regeneration with emphasis on national–local cooperation;
3. to generate policy and practice expertise, good evidence, knowledge and methods that can be used to promote health in all cities in the Region;
4. to promote solidarity, cooperation and working links between European cities and networks and with cities and networks participating in the Healthy Cities movement;
5. to play an active role in advocating for health at the European and global levels through partnerships with other agencies concerned with urban issues and networks of local authorities; and
6. to increase the accessibility of the WHO European Network to all Member States in the European Region

The City of Novi Sad has become a member of WHO European Healthy Cities Network in December 2012, at the end of the phase V. Novi Sad fulfilled all requirements for designation into the Phase V. Sustained local support was acquired by signing a letter of commitment from the city mayor, council resolution supporting the city's participation in Phase V, and forming a steering group. Steering group involved political and executive–level decision-makers from the key sectors. The Healthy City coordinator was nominated and the Public Health Institute of Vojvodina was named as expert support for the project implementation.

The City of Novi Sad enforces health promotion and disease prevention policy throughout its bylaw – Rules on Modality and Procedure of Allocation of Assets from the City of Novi Sad Budget for Health Programs and Projects (Official Herald of the City of Novi Sad no. 51/2009 and 3/2011). This bylaw provides financial support for local health systems and NGO's in addressing major health problems, public health issues.

Based on the document „Health status of Novi Sad population", policies, strategies and activities are recommended to address main public health issues and health problems in the City of Novi Sad.

Relevant competitions are published in the following fields: public health, non-communicable diseases prevention, prevention of drugs abuse, procreative policy, separately for health institutions (both state and privately owned) and for NGOs. The City of Novi Sad has established Committees in the areas above mentioned (assembled of professionals who are recognized due to their professional and/or academic work in relevant areas on local, regional, national and/or international level) with help from more specialized working groups assess technical and professional quality of applications received and, after discussion and conclusions of working groups, decide on received competition applications and projects. Competitions are public (published in the official herald and on the City web page) as well as results. Application and report forms are standardized and professedly published.

Public Health Programmes

Committee for Public Health have given priority to the projects and programmes which are directed to: education of the citizens, especially vulnerable and hard to reach groups in the area of health promotion, disease prevention and use of health care services with the emphasis on the preventive services and increase of the encirclement of preventive checkups; education of educators especially preschool and school teachers in the area of health promotion and

disease prevention; continuing medical education for health care professionals in the area of health promotion, and capacity-building for health equity; education and capacity- building of decision and policy makers on health and health equity; education of the media. Priority topics are healthy lifestyle, healthy eating, physical activity, mental health, suicide prevention, smoking and alcohol prevention, HIV/AIDS prevention, preventive health care use, internet addiction, preventive checkups and screening etc.

Non-communicable diseases prevention programmes

Projects and programmes in the field of non-communicable diseases prevention are sorted in five groups: prevention and control of cardiovascular diseases, diabetes, cancers, chronic respiratory diseases and chronic muscle-skeletal diseases. Projects are directed to education of the citizens about healthy lifestyle, preventing and reducing risk factors, early detection and effective treatment etc, as well as continuing medical education of health professionals. Priority topics are: healthy heart, risk factors for NCD, healthy eating, physical activity, hypertension, educational materials, training in early detection of coronary event and use of defibrillators in public places etc.

Drug Abuse Prevention Programmes

Projects and programmes in the field of drug abuse prevention are sorted in five groups: promotion of healthy lifestyle and community involvement in the prevention, education of preschool and schoolchildren, youth, parents, schoolteachers and educators from other sectors, peer education, secondary and tertiary prevention, and, production of educational materials and tools.

Procreative Policy Programmes

Projects and programmes in the field of procreative Policy are sorted in two groups: education of children and youth and reproductive health promotion and prevention of women. Projects and programmes are directed to education about reproductive health aimed at target population groups such as adolescents, women in the reproductive period, pregnant women, schoolchildren, young parents and Roma women. Priority topics are contraception, STD prevention, reproductive hygiene, puberty and adolescence, psychological and emotional changes, relationships, responsible parenting, family planning, pregnancy and delivery, postpartum period, breastfeeding etc.

Examples of good practice in year 2012

Health Promotion Campaign „October – month of healthy eating“

Duration: 2004-2012

Aim: Increasing knowledge and skills about healthy eating

Target population groups: preschool and schoolchildren, teachers, parents, health professionals

Partners: Public Health Institute of Vojvodina, Primary health care institutions, kindergartens, schools, City Health Administration, University of Novi Sad, Media

Results in year 2012:

- Health Education Tool “Fruits and vegetables cards” intended for children in all kindergartens and primary schools

- Educational material for all preschool and schoolteachers

- Educational seminars for 60 preschool and schoolteachers

- Educational seminars for 160 health professionals

- Creative painting and writing about healthy eating Contest (45 kindergartens and 30 schools participated)

- Public event in the City Hall Art and literary works show exhibition of awarded works with creative program prepared by preschool children „What we learned about fruits and vegetables“

- Public event “Let’s cook together” – demonstration of preparation of healthy meals in kindergartens and primary schools together with students of Gastronomy

- Public event “Fruits and vegetables show” in the Shopping Center, with individual counseling of the visitors

Promotion of preventive services of Primary Health Care Center „Open door day“

Duration: 2007-2012.

Aim: Promotion of preventive checkups and detection of risk factors for NCD

Target population: adult population

Partners: Primary Health Care Center Novi Sad, Emergency Health Care Service, Public Health Institute of Vojvodina, City Health Administration, Local community, Media

Results in year 2012:

- Health professionals action in public places, outreaching citizens

- 17 Actions in local community

- 6307 citizens

- Preventive checkups and measurements of blood pressure, blood sugar, cholesterol, BMI etc

- Questionnaire about risk factors

- ECG monitoring and cardiology counseling

Health education of children Programme „ Healthy calendar“

Duration: 2004-2012.

Aim: Increasing knowledge and skills about healthy lifestyle and safety

Target population groups: preschool and schoolchildren, teachers, health professionals

Partners: Public Health Institute of Vojvodina, kindergartens, schools, City Health Administration, Media

Topics presented so far: healthy lifestyle, my body, healthy eating, physical activity, hygiene, risk behavior, traffic safety, injury and poisoning prevention, mental health, learning about feelings etc.

Results in year 2012:

- Production of health educational tool Healthy calendar containing illustrations, instructions, workshops and exercises

- Year 2012. topic was infectious diseases prevention „Look out of infections“

- Educational material for all preschool and schoolteachers containing workshops and the theoretical knowledge

- Educational seminars for 98 preschool and schoolteachers

- Educational seminars for 83 health professionals

Health promotion actions for persons with intellectual disability „Learn and be active for health“

Duration: 2010-2012

Aim: health education and promotion of physical activity

Target population: persons with intellectual disability

Principle organizer: NGO Association for support of persons with Down syndrome

Partners: Persons with disability associations, volunteers, local community, health professionals, teachers

Results:

- Workshops, lectures about healthy lifestyle every month

- Physical activity sessions – yoga, dancing, gymnastics, every week

- Creative art expression sessions

Conclusion

Health promotion and disease prevention programmes in the City of Novi Sad are supported by City Administration for Health through its bylaw. Priority is given to the projects and programmes that are directed to health education and health promotion particularly for vulnerable population groups, educating educators, providing appropriate amount of health education tools and educational materials, facilitating partnership within health sector as well as interdisciplinary and multi-sector partnership, empowering health professionals in the area of public health and health promotion, empowering local community and NGO’s, and continuously providing information about public health issues for the public.

The City of Novi Sad is dedicated in enforcing health promotion and disease prevention programs for over a decade through its policies, strategies and financial support. Since the City of Novi Sad has become Healthy City in December 2012, we expect to grow awareness and commitment to health, resulting in mobilizing all citizens to take a Whole of Society approach.

Key words: Healthy cities, health promotion programmes, disease prevention programmes

References:

WHO European Healthy Cities Network. Available at http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/activities/healthy-cities/who-european-healthy-cities-network

Health 2020: a European policy framework supporting actions across government and society for health and well-being. Copenhagen, WHO Regional Office for Europe, 2012

(http://www.euro.who.int/en/what-we-do/health-topics/health-policy/health-2020-the-european-policy-for-health-and-well-being, assessed 15 July 2014).
Joan Devlin. WHO Belfast Secretariat, European Healthy Cities Network. WHO Healthy Cities network Cities and National Networks. Available at 3. http://www.publichealth.ie/sites/default/files/Joan%20Devlin%20Presentation%2016%20Nov%202011.pdf
World health Organization Regional Office for Europe. Review of social determinants and the health divide in the WHO European Region: final report. World Health Organization 2013.
Niciforovic Surkovic O, Petrovic V, Ac Nikolic E, Uveric Radovic M. Health promotion and disease prevention programmes in Novi Sad. Annual Business and Technical Conference of the WHO European Healthy Cities Network and Network of European National healthy Cities networks, Izmir, Turkey 2013 Book of abstracts 64.

2. THE IMPORTANCE AND ROLE OF PROGRAMS FOR THE PROMOTION OF REPRODUCTIVE HEALTH

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Reproductive health

Preserving and improving reproductive health is one of the most important prerequisite for getting healthy generations, what the basis of the survival and progress of civilization. Promotion of reproductive health is a special part of a overall health promotion. It involves educating individuals about the knowledge and skills for the healthy lifestyle selection in the area of sexuality, but also the wider social intervention with the aim of construction of appropriate public health policies supported by the social environment.

Reproductive health is directly conditioned by the social, cultural and behavioral factors. Reproductive life may seem pleasant, and a supportive events and conditions such as A pleasure, intimacy, joy, love, giving birth and raising children and a happy family life, but also those that threaten health, such as inequality, abuse and disease.

Among the many factors that affect reproductive health, fertility regulation is among the most important. The fundamental right of women is to have control over their fertility and to have secure protection during pregnancy, childbirth and abortion if the pregnancy is unwanted. This is especially important since we know that half of all pregnancies are unplanned, and one-quarters is unwanted (1).

The importance of programs for the promotion of reproductive health

By protecting women from the risk of pregnancy and its associated complications, programs for the promotion of reproductive health can play a vital role in the reduction of infant, child and maternal morbidity and mortality. By preventing unwanted pregnancies, programs can also reduce abortions by unskilled providers or under unhygienic conditions. However, the benefits go beyond improvements in maternal and child health. For girls and women, for example, programs for the promotion of reproductive health can result in higher educational attainment, better employment opportunities, higher socioeconomic status and empowerment.
Despite extensive global efforts and investments to reduce maternal mortality, this remains high in many developing countries. The 22 million “unsafe” abortions that occur each year cause an estimated 47 000 maternal deaths – mostly in developing countries – and lead to short-term or lifelong disabilities in many women. It has been estimated that up to one third of maternal deaths could be averted through the use of effective contraception by women wishing to postpone or cease further childbearing. About 222 million women in developing countries are thought to have an unmet need for a modern method of family planning. This unmet need is particularly prevalent in certain populations, especially sexually active adolescents, individuals with low socioeconomic status, those living in rural communities and those coping with conflicts and disasters (1).

In some developing countries, increased contraceptive use has already cut the annual number of maternal deaths by 40% over the past 20 years and reduced the maternal mortality ratio by about 26% in little more than a decade. It has been estimated that a further 30% of the maternal deaths still occurring in these countries could be avoided if the unmet need for contraception could be fulfilled. Modern methods of contraception would prevent 54 milion unintended pregnancies and 26 milion abortions (of wich 16 milion would be unsafe) (2).
Reduction in maternal and infant morbidity and mortality, access to and use of contraception also contributes to individuals being able to take control over their sexuality, health and reproduction, thus helping them to achieve a satisfying sexual life.
WHO programs related to preservation of reproductive health include the following objectives:

- reaching maturity and healthy sexual maturation in addition to creating opportunities for equitable and responsible relationships between the sexes,
- achieving the desired number of children in a safe and healthy way by his own decision (when couples decide)
- prevent diseases and health disorders related to sexuality and reproduction and obtaining appropriate care when it needed,
- preventing violence and other harmful practices related to sexuality and reproduction.

At the International Conference on Population and Development that was held in Cairo, Egypt, in 1994, representatives of 179 countries agreed to a programme of action to improve global sexual and reproductive health. The representatives called for universal access to comprehensive reproductive health services – including family planning information, services and supplies – by 2015. Research plays a critical role in the response to such global health challenges. It is also essential in identifying and overcoming the social and economic inequalities and health system deficiencies that obstruct the achievement of the highest attainable standards of sexual and reproductive health for all. Even when highly effective interventions exist, implementation research is needed to identify the most effective and efficient mechanisms for delivering those interventions. Effective mechanisms and strategies to prioritize investments in health-related research are particularly needed in resource-poor settings – in developing countries and elsewhere. In addition, any research priorities that are set need to be reviewed and updated at regular intervals (3).
The “Family Planning 2020” initiative builds on the partnerships that were launched at the London Summit on Family Planning in July 2012. It is hoped that this initiative will sustain the momentum created at the Summit and ensure that all the “partners” are working together to achieve the main goal announced at the Summit: making contraceptive information, services and supplies available to an additional 120 million women and girls by 2020. The partners in the initiative have been tasked with both the identification of any obstacles to achieving the initiative’s aims and the recommendation of possible solutions. The plan is to identify gaps in our relevant knowledge and the global priorities for action to address the unmet need in family planning and growing demand for contraceptives (4).

Historical development of programs for the promotion of reproductive health

The first written records about family planning and methods of regulating fertility of women, are in the Ebers papyrus, to physical writings of ancient Babylonians and the scriptures of the Vedas. Many grasses, lichens and roots practiced by American Indians - Shoshone and Navajo. While in Sparta often practiced infanticide in Athens was known for contraception.

Aristotle advocated the legal limit family size and recommended olive and cedar oil as contraceptives (5).

One of the oldest contraceptive method is withdrawal (Coitus interruptus). Biblical records state that Onan in preventing pregnancy using withdrawal. St. Augustine was practiced coitus interruptus during the 11 years during which time he had only one child. In the 17-century 99.9% of men were applied interrupted intercourse to prevent conception in Siena (6).

In the Middle Ages, science has not studied methods to prevent conception. Since 1800th-1900th Information and counseling patients about contraception was illegal.

Birth control begins in 1912 when Margaret Sanger, the nurse who has worked in public health, floated the pernicious effects of frequent abortions and birth and spread information about the types of contraception. She opened the first family planning counseling in New York in 1916 against the law. Police closed the counseling office, but after that, the president of the United States has allowed doctors to prescribe contraceptives for health reasons. In England, Mary Stops opened the first family planning in Europe in 1921 (7).

Modern contraception begins in 1960 with the introduction of intrauterine devices in widespread use. Since 1965. pills have become the most popular contraceptive method, and after that there is increasing use of condoms and sterilization. Since 1970th-1980th number of services for family planning is growing rapidly. Since 1991., 96% of the governments through their policy directly support family planning programs, while in 1974 only 55% of them supported these programs (8).

Programs for the promotion of reproductive health in the world

Promotion of reproductive health is carried out in several ways:

Through counseling (services) for family planning. Their task is the information, education and communication for the selection of appropriate contraceptive methods (9).

- CBD (Community-based distribution) is a strategy where a trained non-professionals (community members) participate in family planning. They explain the various methods of contraception to clients. CBD helps public and private services for family planning in order to make family planning more accessible, especially in rural areas. CBD has been performing for 20 years in 40 countries around the world (10).
- In order to promote a method of family planning in underdeveloped and developing countries, media are often used in the form of radio-soap operas, radio drama and others, giving information about using of certain contraceptives. CSM program (social marketing of contraceptives) uses a commercial marketing techniques (especially massmedia) to promote the use of modern contraceptives. The program has been implemented since 1967 in 30 countries in Asia, Africa and Latin America, includes 5-15% of couples in reproductive ages and it is especially effective in areas where it is not well developed network of health care institutions (11).
- Education of young people about HIV and sexually transmitted infections is carried out in the countries of the Middle East and North Africa, most often throughout the media (TV, Internet) and mobile phones. So called ‘’Hotline’’ is opened in Egypt and Oman in order to give information. ABC educational program is introduced that includes: A-abstinence as the first possible choice for young, B-Be faithful (to your partner), C-Condom (sexually active young people should use condoms) (12).

- "South-to-South" cooperation, which includes 16 countries from Asia, Africa and Latin America has been launched in order to promote reproductive health in developing countries. The essence of this collaboration is to improve the reproductive health of the population in these countries, to define common goals, and interventions that need to be taken to achieve these goals (13).
- Association for Family Planning in Tunisia initiated a program of improving the reproductive health of students in this country. The project included 6,000 students and consisted in increasing their knowledge about unwanted pregnancy and sexually transmitted infections ("double protection project") (14).
- There is a regional strategy for the promotion of reproductive health in Northern Ireland. Its mission is to reduce the incidence of sexually transmitted infections, to reduce the number of unwanted pregnancies, to provide adequate and effective information about sexual health and to increase access to services for reproductive health (15).
- In Ukraine, which adopted a national reproductive health strategy in 2006, the main goals within the program were to implement services addressed to young people, to promote safe behaviour and to develop curricula for youth sex education on a national level. Latvia implemented sexuality education as a statutory part of school health education in 2005 (15).
- In Uzbekistan, the action plan to introduce Youth-Friendly Services throughout the country and to implement school sex and reproductive health education was funded by the UNESCO in its initial phase (15).
- As for the Western European Region, there is growing awareness of the need to develop approaches that address the diverse needs, attitudes, cultural and social backgrounds of young people, in order to gather experience regarding how to promote the inclusion of diverse groups, particularly young migrants, in sexual and reproductive health program and services (16).

Reproductive health promotion in Serbia:

Republican Center for Family Planning was founded as part of the Institute for Health Protection of Mother and Child. The counselling for pregnant women, counseling for children and adolescents and family planning counselling are formed in primary health care, the department of health care for women and children. Counselling for family planning includes: improving human relations between the sexes; prevention and early detection of genetic disorders; prevention, early detection and treatment of infertility; prevention of unwanted pregnancy.

Serbia, like many countries in the world, has defined program for family planning as an instrument of the state population policy. The program was adopted in 1998. and named Information about family planning. It has been established eight targets of the program in which they developed activities related to health care. This program in Serbia has never been realized (17).

Conclusion

For today's generation, reproductive health is part of overall health, and for the future ones, it will be a significant part of the socio-economic development. Therefore, it is necessary to develop new and improve existing programs for reproductive health.

References

1. World Health Organization. Bulletin of the World Health Organisation, article ID:BLT.13.122242. A global research agenda for family planning:results of an exercise for the setting of research priorities. Geneva, 2013.
2. World Health Organization. Ensuring human rights in the provision of contraceptive information and services: guidance and recommendations ISBN 987 92 4 1506748. Geneva, 2014.
3. World Health Organization. Reproductive health and research. HRP at 40: what they say, a history of scientific achievement to advance sexual and reproductive health. Geneva, 2012.
4. Family Planning 2020. Washington, DC: Family Planning 2020; 2012. Available from: http://www.familyplanning2020.org/summit.php [accessed 26 September 2013].
5. Potts M, Selman P. Society and Fertility. Macdonald and Evans, London, 1979.
6. IPPF Central Ofice. Medical File , London N_1, 1980.
7. CDC. Achievements in Public Health (Cited 2002, August 2); Avaliable from CDC:http://Achievements in Public Health.htm.
8. WHO. World Health Report. Geneva, 1998.
9. World Health Organization. Preventing Early Pregnancy and Poor Reproductive Outcomes Geneva, 2011.
10. WHO. Comunity-Based Distribution of Contraceptives. Geneva, 1995.
11. WHO. Reproductive Health Matters. Geneva, 1994.
12. United Nations. High-Level Meeting: Time to Scale Up the AIDS Response. NGLS Roundup 126. Washington, 2006.
13. Silla BM. Promoting and strengthening South-to-South Cooperation: capacity building in south-south partnerships. Population, 2005: 137-145.
14. Tunissian Family Planning Association. Breaking the Silence: Young People's Sexual and Reproductive Health in the Arab States and Iran. Tunisia, 2003.
15. World Health Organization. Conference on Youth Sex Eeducation in a Multicultural Europe. Geneva, 2006.
16. Kumar M., Lim R, Langford K, et al. Sexual knowledge of Canadian adolescents after completion of high school sexual education requirements. Paediatr Child Health, 2013; 18(2):74-80.
17. Gavrilović, A. Program za planiranje porodice - jedan od puteva za promenu reproduktivnog ponašanja. (The family planning program - as a way of changing reproductive behavior). Potomstvo, 2001; (1): 3-5.

ORAL PRESENTATIONS

1. PSYCHOSOCIAL CONSEQUENCES OF ALCOHOL USE AMONG YOUTH

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Any use of alcohol among juvenile persons shall be deemed abuse of alcohol and has great effects on the growth and development of youth.

Objective: overview of the psychosocial consequences of alcohol use in relation to sex, age, place of residence and family social status of the respondents.

Methods: This survey included 1,340 respondents, 680 girls and 660 boys from Nis district. Examinees were formed into four age groups: under 14 years (279), 15-17 years of age (308), 18 to 20 years of age (324), and 21 and over (429 respondents).

Results: 50.4% of respondents were drunk at a party (more boys than girls (χ^2= 21.61, p <0.0001)). Respondents older than 18 years were more likely to have been drunk at the party than juveniles (χ^2= 115.78, p <0.0001).

46.6% of young people were in the car with a drunk driver (the largest number in the age group 15-17 years, at least the youngest (χ^2= 166.95, p <0.0001)). Slightly more boys than girls traveled with a drunk driver (χ^2= 6.16, p <0.05). 17.6% of respondents have driven drunk (more respondents with 21 or more years compared to other age groups (χ^2= 166.95, p <0.0001)). Boys were driving drunk four times more often than girls (χ^2= 100.69, p <0.0001).

16.6% of respondents had been absent from school due to use of alcohol, two and a half times more boys than girls (χ^2= 49.06, p <0.0001), more young people aged 18-20 years compared with other age groups (χ^2= 41.65 p <0.0001) and more young people from the suburbs in relation to young people from town and country (χ^2= 9.96, p <0.05).

14.2% were drunk in classes (more young people aged 18-20 years compared with other age groups (χ^2= 39.54, p <0.0001)). Boys were drunk at school three times more often than girls (χ^2= 58.48, p <0.0001).

13.6% of young people acted violently at the influence of alcohol, seven and a half times more boys than girls (χ^2= 100.69, p <0.0001). Bullies were more in age from 18 to 20 years compared to other age groups (χ^2= 14:45, p = 0.002, p <0.01). Violent behavior at the influence of alcohol was the most common among young people with poor economic conditions, while less was present among young people with good and medium finances (χ^2= 15.77, p <0.0005).

9.3% of respondents had injuries as a consequence of alcohol consumption (more adults than juvenile (χ^2= 1.17, p = 0.0007, p <0.001)). Boys are frequently injured twice as often as girls in a drunk state (χ^2= 20:35, p <0.0001).

11.4% of respondents had family problems due to alcohol, twice as many boys than girls (χ^2= 28.12, p <0.01), more respondents of 21 years and over compared with other age groups (χ^2= 28.12, p <0.01), more young people from rural villages and cities than young people from countryside (χ^2= 6.62, p = 0.037, p <0.05).

Conclusion: The more successful health education treatment aimed at reducing youth drinking, should be focused on gaining knowledge about the health consequences of alcohol. It is necessary to include peer education, through activities in locations where young people learn, where they spend their free time, with the use of the media, the internet and telephone counseling services.

Key words: alcohol, young.

2. BELGRADE HIGH SCHOOL STUDENTS' BEHAVIOUR DETERMINANTS AND ATTITUDES REGARDING ALCOHOL DRINKING HABBITS AND THEIR INFLUENCE ON HEALTH

Anđelka Brković

Public Health Institute, City of Belgrade

Objectives: Getting insight into the drinking habits of Belgrade high school students and define appropriate public health interventions.

Materials and methods: The research was carried out as a cross-sectional study. The sample used was composed of 202 first and fourth-grade students of the First Belgrade Gymnasium and Law-Business High School. The research instrument used was the questionnaire created in accordance with the ESPAD questionnaire. Methods of descriptive and inferential statistics were applied.

Results: A total of 95,4% of the respondents have consumed alcohol at least once. The fourth-grade students drink more frequently than the first-grade students. A total of 40,3% of the students have reported heavy episode drinking during the past 30 days. Alcohol is more often consumed in bars than bought in supermarkets. The strongest peer influence on adopting drinking habits is shown among the fourth-grade girls. Significant number of students finds alcohol a factor of good fun and does not connect it with health risks.
Conclusion: Widespread usage of alcohol among adolescents, combined with strong peer influence and low awareness of consequent health risks emphasizes the need for developing psychosocial programs in schools with active involvement of healthcare professionals.

Key words: alcohol, adolescents, high school, ESPAD, heavy drinking.

3. THE ROLE OF THE FAMILY DOCTOR IN HEALTH PROMOTION WITHIN THE TERITORY OF REPUBLIC OF SRPSKA

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Aim: The aim of this study was to compare the leading diseases groups in Republic of Srpska for a five-year period and to present the role of the family doctor in health promotion.

Method: The facts by the Public Health Institute of Republic of Srpska are used for this study. These facts refer to analysis of population health in Republic of Srpska in 2007. and 2012.

Results: Five the most common diseases groups in Republic of Srpska and regions Banjaluka, Bijeljina and Zvornik in 2007. and 2012. were: diseases of the circulatory, respiratory and genitourinary system, factors influencing health status and contact with health services and diseases of the musculoskeletal system and connective tissue. In Foca region in 2007. and in Trebinje and East Sarajevo regions in 2007. and 2012. among five the most common diseases groups were digestive diseases. In Doboj region in 2012. among the five most common group of diseases were diseases of endocrine glands, nutrition and metabolism.

Conclusion: Chronic mass non-communicable diseases are the leading cause of morbidity and mortality in Republic of Srpska. The family doctor plays an important role in health promotion and education about healthy lifestyles in order to prevent morbidity and mortality of population.

Key words: family doctor, family medicine, diseases groups, morbidity and mortality, health promotion

4. REPRESENTATION OF SMOKING BY HEALTH WORKERS

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Introduction: We want to piont out the percentage of the health workers smoking habits,smoking duration,the number of the daily smoked cigarettes, in regard to age ,profession and sex. Knowing that fight against smoking is one of the most important mission of public health service.

Goal: To tell the real representation of smoking by health workers.

Method: The 38 doctors have been asked for an opinion and also 124 medical nurses and technicians with a poll.

Results: Of the whole 162 health workers who filled in the questionnaire,65 of them are smokers (40,12%) ,21 (12,96%) ex-smokers and 76 (46,91%) are nonsmokers. The percentage of doctors nonsmokers is higher within men (68,42%) then within women(47,36%). The active smokers at highter rate are female doctors with lenght of service of 20-29 years. The percentage of ex smokers within doctors of both sexes is the same. The smoking duration between female doctors is on the average 8,5 years(male doctors 4,5 yeras) and the average number of the smoked cigarettes is 13(male 11 smoked cigarettes).

Conclusion: The number of smokers between health workers is inadmissible high (40,12%).

Key words: Smoking,health workers

5. INNOVATION OF HEALTH EDUCATION ACTIVITIES IN THE FIELD OF SEXUAL AND REPRODUCTIVE HEALTH OF ADOLESCENTS

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Today, adolescents develop themselves in an era of free access of information through all means of media, especially internet and mobile telephony. Uncontrolled and free use of large number of disparate information, which are available to adolescents through these media, are leading and will lead to the increased number of reproductive and sexual health risk behavior in the future. At the same time, the mass use of modern electronic media by young people gives the opportunity to reduce the risk behavior of adolescents and youth by increasing the fund of applicable knowledge and level of motivation in everyday life. This kind of informing will help them maintain and improve their health. Due to many changes of lifestyle of adolescents, there is a need to innovate the current approach of health education work to the previously mentioned topics, especially in the sense of greater exploitation of modern media, (like internet and mobile telephony), whose numerous users are actually adolescents and youth in general. The purpose of this study was to show the models of using the modern media in the field of health education work.

Key words: adolescents, sexual health, reproductive health, media

6. SOCIAL CHARACTERISTICS AND THEIR RELATEDNESS WITH HEALTH CARE OF THE ELDERLY WITH DISABILITIES

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The health condition of disabled people itself needs more care and looking after, especially when it comes to the eldrly.

The aim of our project was determination of social characteristics and their relatedness with health care of the elderly with disabilities. 164 people were polled (107 women and 57 men) with the average age 80,49±6,76.

Every second examinee (56.1%) was bedridden for more than a year. Most of the examinees (94.5%) have somebody to look after them. More the 50% of the examinees are satisfied with their economic status, more than a half (58.5%) are satisfied with their social status, while only 5.5% of them are linked to the social service. Only 4.3% of them are members of the association of disabled people. Even 76.2% were not on rehabilitation during the previous years, 77.3% of them were not visited by a physician for home care, while 86.5% would firstly address a family member when they have any health problem. Only a third of the examinees (36.4%) consider their health condition satisfactory.

Our data indicate an unsatisfactory social relatedness and some omissions in giving health protection to this vulnerable population. Therefore it is necessary to work on amelioration of the existing capacities and making new ones to support disabled people.

Key words: disability, health care

7. ACTUAL PUBLIC HEALTH ISSUES IN THE FIELD CONCERNING THE ELDERLY POPULATION

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By studying the tendencies of demographic change, both on the global and at the national level, it can be noted that there has been a regular movement to a more prominent aging of the population. In the most developed countries, for 2025, the share of those older than 65 is expected to be 27.5% from the total population, while the share of the elderly in Southern Europe is expected to range from 9.1 to 17.7%. According to the predictions of demographers, the share of the elderly in Serbia will range from 18.7% to 27.5% in 2025. As a result, the segment of the elderly population exceeding the age of 75 will especially considerably increase, which will have significant health, economic and social repercussions. **The aim of this paper** is to emphasize the actual public health issues of the elderly population in our country, as well as in the area of the region of Nis, to point out the expectations regarding their movement in the future, as well as to instruct of the need to undertake adequate measures, primarily in the field of primary health care, as well as the community, with the aim of the irreduction and resolution. In the **methodology**, we used the information from present statistical and other public health research in the regions of Europe, Serbia, South-East Serbia and the region of Nis, as well as the results from our own research on the sample of 1295 people older than 65. The **results** are the following: the elderly population is in economic jeopardy, bearing in mind the amount of pensions and the orientation of the state towards the allocations for the funds of social-economic protection in the future, mortality from cardiovascular and malignant diseases in Serbia highly exceeds the values of the rates in the neighboring countries and countries in Europe; in terms of the treatment of malignant diseases (the rate of five-year survival), Serbia occupies the 25th place in Europe. In the mortality model, there is a predominance in the models whose cause stems from the frequently unhealthy lifestyle (diet, smoking, physical inactivity, low level of general culture and culture in healthcare). On average, every 5th elderly patient gets healthcare instructions from selected physicians. The advice is frequently judged as insufficiently clear, so that most people are oriented towards obtaining information on healthcare from non-medical sources. The following trends are expected: further increase of poverty, increasingly weaker social support and the increase of pressure on the healthcare department by geriatric patients, primarily concerning chronic mass diseases, increase in the home care department services and a more prominent need for various types of geriatric care. In such conditions, the fulfillment of the aims of the WHO concerning active aging must be connected with the increase of measurements for the promotion of health at the level of primary healthcare and the community, by adopting geriatric standards, education of medical workers and a more intensive cooperation of all participants at the level of the community with regard to the realization of relevant programs for the promotion of healthcare in the elderly.

Key words: elderly population, public health issues

8. SAFETY AND POTENTIAL RISK OF SELF-MEDICATION IN NIS REGION

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Introduction: Drugs that are used in self-medication as well as do not require a prescription, are known as "over-the-counter medicines" (OTC) products. These drugs are used to prevent and treat the symptoms of diseases, which are recognized by the patients themselves.

Objective: The aim of this study was to evaluate the awareness of the self-medication in the adult population of the Nis region and to determine its benefit, safety and potential risk for people health.

Respondents and methods: A cross-sectional study included 300 patients which were interviewed and divided into three age categories: aged 18 to 30, 31 to 65 and over 65. This research was performed using an anonymous questionnaire which contained 17 open-ended and closed-ended questions.

Results: Using OTC product is the most common in the respondents aged 18 to 30 (98%). There was statistically significant difference among the groups regarding media influence on the selection of drug ($p<0.05$). The safety of the chosen therapy and awareness of the possible side effects was registered in 60% of the respondents. The idea that self-medication can "cover up" symptoms of some more serious diseases was most widespread among the respondents aged 18 to 30 (84%).

Conclusion: Modern patient actively participate in the process of self - care and self - medication and therefore frequently uses the OTC products with or without pharmacist help. Self medication may provide money saving for the healthcare system, but also it represents the risks for the patients' health. Hence, the role of the pharmacist in patients' education on proper application of self-medication is vital.

Key words: self-medication, OTC products, side effects,pharmacist

POSTER PRESENTATIONS:

1. THE ROLE OF COMMUNITY PHARMACIST IN HEALTH PROMOTION

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Aim: The aim of this paper is to emphasises a new role of pharmacist in health promotion according to the new regulation and a new focus to the pacietns and their welfare.

Material and methods: It was used the data from literature and existing law on Health protection in Serbia.

Results and disscusion: Community pharmacists are the health professionals always available to advice clients who presented with symptoms in the pharmacy. Pharmacist can provide primary health education through being involved in both individual and coordinated initiative to encourage Smoking Cessation, increase Sun Awareness, improve Sexual health, provide Contraception advice and remind young parents of Immunization Schedules. In secondary health education, pharmacist can advice ill people how to change diet in case of having high cholesterol levels, or how to avoid side-efects or how to use an inhaler correctly to someone suffering from asthma. In adition, pharmacist have to increase awareness of patients that counterfeit drugs exist on market and they have to inform their pharmacist if something goes wrong or if there are any adverse drugs reaction.

The very important role of the pharmacist is to giving advice to someone who could not normally expect to be restored to full health as a part of tertiaty health education. For example, this would include advice to the elderly person with diabetes on how to prevent developing diabetic associated complication.

Conclusion: The community pharmacists has many opportunities for Health promotion. The pharmacist shoul liaise with other health professionals and local health promotion units and cooperate with them in special Health promotion projects.

Key words: pharmacist, health promotion, selfmedication, pharmacovigilance

2. STUDENTS' AWARENESS OF THE LINK BETWEEN SALT INTAKE AND HEALTH

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Objectives: The objective of this research was to assess the awareness of the link between high salt intake and health among students from University of Novi Sad.
Materials and methods: The research was carried out in a convenient sample of 1082 students (mean age 20.9±1.9 years, 38.9% males) at the University of Novi Sad, Serbia. Students' awareness of the link between salt intake and health was assessed by a questionnaire.
Results: Majority of the respondents (92.9%) were aware that high salt intake poses a health risk. This percentage was higher among females than among males (95.0% vs. 89.5%, p=0.001). Health problems associated with high salt intake were hypertension (82.9%) and heart problems (64.3%), followed by stroke (35.0%) and obesity (31.7%). Only 3.8% of students recognized stomach cancer as a salt-related health issue. Levels of awareness of specific salt-related health problems was consistently higher among female respondents ($p<0.001$).
Conclusion: Awareness of the link between salt intake and health was high, but substantial knowledge gaps exist about specific salt-related health problems that need to be addressed in future students' education programs.

Key words: Salt intake; Sodium intake; Students; Hypertension