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KAZALO VSEBINE

POMEN CELOVITEGA MEDSTROKOVNEGA SODELOVANJA – PRIKAZ PRIMEROV ŠTUDIJ JAVNEGA ZDRAVJA

THE IMPORTANCE OF COMPREHENSIVE COOPERATION BETWEEN PROFESSIONS: AN OVERVIEW OF PUBLIC HEALTH STUDIES

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Ključne besede

okoljske determinante, medstrokovno sodelovanje, celovit pristop

Katedra za javno zdravje, Univerza v Ljubljani, Medicinska fakulteta / Department of Public Health, University of Ljubljana, Faculty of Medicine, Slovenija

Povzetek

Namen: Za celovit pristop pri opredelitvi in obvladovanju determinant s področja zdravja in okolja je potrebno vzpostaviti medstrokovno sodelovanje. Namen prispevka je bil predstaviti primere dobrih praks s področja javnega zdravja. **Metode:** Osredotočili smo se na aktualne raziskave s področja determinant okoljskega zdravja, pri katerih sodelujejo poleg ostalih strokovnjakov tudi sanitarni inženirji. Predstavili smo raziskave s področja kakovosti zunanjega in notranjega zraka, pomen zdravega bivalnega in delovnega okolja, raziskave s področja humanega biomonitoringa ter najnovejše trende celovitega pristopa ocenjevanja izpostavljenosti. **Rezultati:** Začetki proučevanja pomena kakovosti zunanjega zraka za zdravje segajo v leto 1952, ko se je zgodil "Veliki londonski smog". V slovenskem prostoru imamo na področju ocenjevanja izpostavljenosti onesnaženosti zunanjega zraka vzpostavljen sistem rednega državnega monitoringa, ki ga vodi Agencija RS za okolje (ARSO). Metodološki napredek smo naredili z raziskavo, kjer smo raziskovalci iz Medicinske fakultete in podjetja MEIS d.o.o. razvili algoritem za pripravo ocene izpostavljenosti na ravni majhnih prostorskih enot v fini krajevni in časovni ločljivosti. V evropskem projektu LIFE12 ENV/IT/000834 MED HISS smo raziskovalci iz Nacionalnega inštituta za javno zdravje (NIJZ) in ARSO, v sodelovanju s tujimi partnerji oceno izpostavljenosti razširili na nacionalno raven. Celoviti pristop ocenjevanja kakovosti notranjega zraka in vplive na zdravje otrok smo na NIJZ v sodelovanju s tujimi partnerji izvedli v okviru evropskega Interreg projekta InAirQ. Na področju determinant okoljskega zdravja pomemben metodološki doprinos predstavljajo tudi nacionalni (CRP V3-1640; CRP V3-1722) in mednarodni (HBM4EU) projekti s področja humanega biomonitoringa. V najnovejših raziskovalnih projektih (JAHEE, COST Action IS1408 ICSHNet's) pa proučujemo pomen celovitega metodološkega pri-

stopa ocenjevanja tveganja za zdravje od prenatalnega obdobja naprej. **Zaključki:** V vseh predstavljenih primerih s področja okoljskih determinant zdravja se odraža pomen medstrokovnega sodelovanja. Pri tem pa imajo sanitarni inženirji pomembno vlogo.

Abstract

Objectives: A comprehensive approach in the identification and management of health and environment determinants requires good cooperation between different professions. The aim of the summary was to present the examples of good practices in the field of public health. **Materials and methods:** We focused on the current researches in the field of environmental health determinants in which, among other experts, sanitary engineers also participate. We have presented researches on the quality of indoor and outdoor air, the importance of a healthy working and living environment, biomonitoring researches and the latest trends in a comprehensive exposure assessment approach. **Results:** The studies on importance of outdoor air quality for health begin in 1952, when the »Great London Smog« happened. In Slovenia, we have a system of regular state monitoring for exposure assessment of pollution in outdoor air which is managed by the Environmental Agency of the Republic of Slovenia (ARSO). We made a significant methodological progress with a study where researchers from the Faculty of Medicine and MEIS d.o.o. developed an algorithm to prepare an exposure assessment at the level of small spatial units in fine local and time resolutions. In the European project LIFE12 ENV/IT/000834 MED HISS, researchers from the National Institute of Public Health (NIJZ) and ARSO in cooperation with foreign partners, extended the exposure assessment to the national level. In the Interreg project InAirQ, researchers at NIJZ together with the foreign partners conducted a comprehensive study on indoor air quality and its effects on childrens health. National (CRP V3-1640; CRP V3-1722) and international (HBM4EU) projects regarding the human biomonitoring also represent the important methodological contribution in the field of environmental health determinants. Furthermore, in the latest research projects (JAHEE, COST Action IS1408 ICSHNet's), we are studying the importance of a comprehensive methodological approach of health risk assessment from the prenatal period forward. **Conclusion:** In all of the presented cases from the environmental health determinants, we can clearly see the importance of the inter-professional work and cooperation where sanitary engineers have an important role.

Key words

environmental determinants, inter-professional cooperation, a comprehensive approach

METODE ISTRAŽIVANJA U JAVNOM I EKOLOŠKOM ZDRAVLJU

RESEARCH METHODS IN THE PUBLIC AND ENVIRONMENTAL HEALTH

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Ključne riječi

metode istraživanja, javnog zdravstvo, okolišnog zdravlje, sanitarna profesija

Sveučilište u Rijeci, Medicinski fakultet Rijeka; Nastavni zavod za javno zdravstvo Primorsko-goranske županije / Univesity of Rijeka, Faculty of Medicine; Department of Public Health Primorsko-Goranska County, Rijeka, Hrvatska

Sažetak

Kada govorimo o Zdravstvenoj ekologiji prije svega trebamo naglasiti da se radi o znanosti koja u svojim metodološkim pristupima i metodama obuhvaća stručna i znanstvena istraživanja koja su usmjerena prema određenim aspektima ljudskog zdravlja, uključujući kvalitetu života, koji su određeni međudjelovanjem fizikalnih, kemijskih, bioloških i socijalnih čimbenika u okolišu. Također se odnosi na teoriju i praksu procjenjivanja, ispravljanja, kontrole i prevencije čimbenika u okolišu koji može utjecati na zdravlje sadašnjih i što je još važnije naglasiti budućih generacija. U svojoj kompleksnosti, zdravstvena ekologija je multidisciplinarna znanost koja obuhvaća široki spektar stručne i znanstvene suradnje mnogih fizikalnih i prirodnih znanosti. Treba naglasiti da postoje osnovna tri cilja u pristupu korištenja mnogih metoda u zdravstveno-ekološkim istraživanjima, a to su prije svega znanstveni gdje nam je cilj sakupiti znanje o sudbini i učincima zagađivala u biosferi, zatim tehnološki u kojem moramo razviti i primijeniti metode kako bi se bolje razumjela sudbina i učinci zagađivala u biosferi i praktični u kojemu rezultate svih naših metoda i postupaka moramo upotrijebiti za praktičnu primjenu stečenih znanja i procedura kako bi se riješio određeni problem u okolišu. Moderna stručna i znanstvena istraživanja na kojima u različitim timovima sa svojim znanjem i iskustvom sudjeluju stručnjaci sanitarne profesije, usmjereni su prema otkrivaju promjena u ljudskome tijelu na vrlo niskim razinama biološke integracije kao što je biomolekula. Ta razina biološke integracije dovoljno rano ukazuje na mogućnost razvijanja ireverzibilnih molekularnih promjena na našim molekulama kao rezultat nekog od okolišnih faktora. Tako da možemo reći da je glavni cilj metoda istraživanja javnoga zdravstva i okolišnog zdravlja u budućnosti detektirati promjene na što nižim razinama biološke integracije, kako bi sve javnozdravstvene preventivne radnje koje se temelje na takvim istraživanjima na vrijeme spriječile štetno djelovanje na ljudsko zdravlje i mogućnost razvoja bolesti.

Abstract

When we are talking about Health Ecology, we must first emphasize that it is science that in its methodological approaches and methods encompasses professional and scientific research focused on certain aspects of human health, including quality of life, determined by the interaction of physical, chemical, biological and social factors in the environment. It also refers to the theory and practice of assessing, correcting, controlling and preventing environmental factors that may affect the health of the present and more importantly to emphasize future generations. In its complexity, health ecology is a multidisciplinary science that encompasses a wide range of professional and scientific co-operation with many physical and natural sciences. It should be emphasized that there are basic three objectives in approaching the use of many methods in health-ecological researches, primarily scientific where our aim is to gather the knowledge of destiny and the effects of polluting into the biosphere, then the technology in which we need to develop and apply methods to better understand the fate and effects of polluting the biosphere and practical in which the results of all our methods and procedures must be used for the practical application of acquired knowledge and procedures to solve a particular environmental problem. Modern professional and scientific research in which teams of experts in the sanitary profession work with their knowledge and experience, focusing on discovering changes in the human body at very low levels of biological integration such as biomolecules. This level of biological integration sufficiently early suggests the possibility of developing irreversible molecular changes on our molecules as a result of some of the environmental factors. So we can say that the main objective of public health research and environmental health research in the future is to detect changes to the lower levels of biological integration, so that all public health preventative actions based on such research will in time prevent the adverse effects on human health and the possibility of developing a diseases.

Key words

research methods, public health, environmental health, sanitary profession

POTENCIAL NARAVNIH POVRŠINSKO AKTIVNIH SNOVI ZA OBVLADOVANJE BAKTERIJSKE ADHEZIJE

POTENTIAL OF NATURAL SURFACTANTS FOR THE CONTROL OF BACTERIAL ADHESION

doc. dr. Rok **FINK**, dipl. san. inž.

Ključne besede

bakterijska adhezija, naravna čistila, *E. coli*

Povzetek

Interakcije med mikroorganizmi in kontaktnimi površinami igrajo pomembno vlogo v medicini, farmaciji, živilski tehnologiji in v vsakdanjem življenju, kjer skušamo obvladovati mikrobno populacijo na primerno nizki ravni. Klasična čistilna sredstva so sicer učinkovita, vendar imajo negativni vpliv na okolje. Zato velik potencial predstavljajo naravna čistilna sredstva na osnovi ekstraktov rastlin, ki imajo širok spekter delovanja, nizko stopnjo odpornosti, obenem pa so tudi okoljsko in zdravstveno sprejemljivi. Namen raziskave je bil analizirati potencial naravnih površinsko aktivnih snovi za obvladovanje bakterijske adhezije na površinah. Analizirali smo učinkovitost odstranjevanja bakterij *E. coli* s standardnim čistilnim sredstvom natrijev dodecilsulfat, ter naravnimi ekstrakti divjega kostanja, pralnih oreščkov in kvilaje. Rezultati števila celic na površini kažejo, da se učinkovitost vseh analiziranih čistilnih sredstev povečuje s koncentracijo čistila. Hkrati smo ugotovili, da standardno čistilno sredstvo odstrani do 95% adheriranih bakterij *E. coli*, sledi mu ekstrakt kvilaje s 66%, pralnih oreščkov 62% in divjega kostanja 42%. Ekstrakti naravnih površinsko aktivnih snovi so sicer manj učinkoviti v primerjavi s standardnim čistilom vendar predstavljajo velik potencial k raziskovanju načinov ekstrakcije, ki bi povečali učinkovitost čistilnih sredstev in omogočili aplikacijo takšnih čistil v praksi.

Univerza v Ljubljani, Zdravstvena fakulteta / University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenija

Abstract

Interactions between microorganisms and contact surfaces play an important role in medicine, pharmacy, food technology and in everyday life, to control the microbial population at an appropriate low level. Classic cleaning agents are effective, but they have a negative impact on the environment. Therefore, great potential represent natural cleaning agents based on plant extracts that have a wide spectrum of activity, low levels of resistance, and at the same time they are environmentally and health acceptable. The aim of the study was to analyze the potential of natural surfactants to control bacterial adhesion on surfaces. We studied the efficacy of *E. coli* removal with standard detergent sodium dodecyl sulfate, and natural extracts of wild chestnuts, washing nuts and quillaja. The number of cells on the surface indicate that the efficiency of all analyzed cleaning agents increases with the concentration. Moreover, we found that the standard cleaning agent removes up to 95% of adherent *E. coli* bacteria, followed by a quillaja extract with 66%, wash nuts 62% and wild chestnut 42%. Extracts of natural surfactants are less effective compared to standard detergents, but they represent a great potential for exploring extraction methods that would increase the effectiveness of cleaning agents and allow the application of such cleaners in practice.

Key words

bacterial adhesion, natural cleaning agents, *E. coli*

PRITRJEVANJE BAKTERIJ *LEGIONELLA PNEUMOPHILA* NA STENE VODOVODNIH CEVI

LEGIONELLA PNEUMOPHILA BIOFILM FORMATION ON THE PLUMBING MATERIALS

doc. dr. Martina **ODER**, dipl. san. inž.

Ključne besede

Legionella pneumophila, oprijem bakterij, biofilmi

Povzetek

Bakterije iz rodu *Legionella* so v majhnih koncentracijah prisotne v naravnih vodnih virih povsod po svetu. Idealni pogoj za njihovo razmnoževanje in tvorbo biofilma je temperature vode med 25 in 45 °C (pogoji v vodovodnih sistemih). Oprijem bakterij na površine je kompleksen proces na katerega vplivajo številni faktorji. Poleg značilnosti bakterij, na oprijem vplivajo tudi lastnosti materiala in pogoji v okolju. V naši smo uporabili standardni sev bakterij *Legionella pneumophila* subsp. *pneumophila* ATCC 33152. Intenzivnost oprijema bakterijskih celic smo ugotavljali z merjenjem koncentracije barvila kristal vijolično, ki se sprosti iz obarvanih celic oprijetih na površini. V naši študiji smo preučevali oprijem bakterij *L.pneumophila* na petih različnih materialih, ki se najpogosteje uporabljajo v vodovodnih sistemih. Poskuse smo izvedli pri treh različnih temperaturah. Materiali so se razlikovali glede hrapavosti in hidrofobnosti. Rezultati so pokazali, da se bakterije najbolj intenzivno oprimejo pocinkanih cevi, ki imajo najbolj hrapavo površino. Nastanek biofilma je bil drugi najintenzivnejši na bakrenih ceveh, ki pa so hkrati najmanj hrapave. Na oprijem bakterij *L. pneumophila* je vplivala tudi temperatura, saj je bil oprijem največji pri 36 °C, nato pri 50 °C, medtem ko je bila najmanjša intenzivnost tvorbe biofilma zaznana pri temperaturi 15 °C.

Univerza v Ljubljani, Zdravstvena fakulteta / University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenija

Abstract

Legionella bacteria are found worldwide in freshwater sites but in most cases they are present at low concentrations. The temperature between 25 and 42 °C (condition in plumbing systems) represent the ideal conditions for L*egionella* multiplication and biofilm formation. Bacterial adhesion is a complex process influenced by many factors. In addition to the bacteria characteristics, the adhesion of bacteria to surfaces is also influenced by the material properties and environmental conditions. A standard strain of bacteria *Legionella pneumophila* was used in this study. The intensity of the cell adhesion was established by measurement of the concentration of crystal violet dye released from pre-stained adhered bacterial cells on the surfaces. In our study we examined the adhesion of *Legionella pneumophila* to five different materials commonly used in plumbing systems and at three different temperatures. Moreover, the materials differed in roughness and hydrophobicity. The results showed that bacteria adhered the most intensely to galvanized pipes which is also the roughest surface. Howsoever biofilm formation was the second most intense on copper tubes, which are contrary the least rough. Adhesion of the *L. pneumophila* was also influenced by the temperature because the adhesion was the highest at 36 °C, followed by 50 °C, while the lowest intensity of biofilm production was detected at a temperature of 15 °C.

Key words

Legionella pneumophila, bacterial adhesion, biofilms

OPORTUNISTIČNI PATOGENI MIKROORGANIZMI V VODOVODNIH SISTEMIH: TVEGANJE ZA OKOLJSKO ZDRAVJE

OPPORTUNISTIC PREMISE PLUMBING PATHOGENS: THE EMERGING ENVIRONMENTAL HEALTH RISK

prof. dr. sc. Ivana **GOBIN**, dipl. san. inž.

Ključne riječi

kvaliteta vode, oportunistički patogeni u vodoopskrbnim sustavu, biofilm

Sažetak

Razvijen vodoopskrbni sustav i dostupnost kvalitetne i zdravstveno ispravne vode za ljudsku potrošnju predstavlja važan dio životnog standarda. Opskrba stanovništva zdravstveno ispravnom vodom za piće ovisi o kvaliteti i čistoći vode u prirodi, načinu pročišćavanja i dezinfekcije vode te sanitarno-tehničkih i higijenskih uvjeti vodoopskrbnih objekata. Za razliku od klasičnih patogena koji se prenose vodom (*Salmonella* i *Shigella*), sve veće probleme u medicini, ali i privredi stvaraju autohtoni stanovnici voda, koje nazivamo oportunistički patogeni u vodoopskrbnim sustavu (OPPP od *engl*. ***O****portunistic* ***P****remise* ***P****lumbing* ***P****athogens*). U ovu skupinu patogena ubrajamo bakterije iz rodova: *Legionella, Mycobacterium*, *Pseudomonas*, *Acinetobacter,* ali i amebe, kao *Acanthamoeba*. Zajednička obilježja ovih bakterija su otpornost prema dezinfekciji, adhezija na cijevi i formiranje biofilma, preživljavanje unutar ameba te rast u skromnim nutritivnim uvjetima. Također, ove bakterije sve češće dovode do razvoja infekcija povezanih sa zdravstvenom skrbi (bolničke infekcije). Unatoč provođenju preventivnih i protuepidemijskih mjera sve češća je pojava infekcija uzrokovanih ovim bakterijama, te su novi pristupi i metode za njihovo uklanjanje iz vode neophodne.

Sveučilište u Rijeci, Medicinski fakultet u Rijeci, Zavod za mikrobiologiju i parazitologiju / University of Rijeka, Faculty of Medicine, Institute for Microbiology and Parasitology
Rijeka, Hrvatska

Abstract

A water supply system and the availability of quality and safety of water for human consumption is an important part of living standards. The supply of population with potable water depends on the quality and purity of water in nature, the method of purification and disinfection of water and the sanitary, technical and hygienic conditions of water supply facilities. Unlike conventional waterborne pathogens like, *Salmonella* and *Shigella*, increasing problems in medicine, but also in the economy are created by autochthonous inhabitants of the water, which we call Oportunistic Premise Plumbing Pathogens. This group of pathogens include bacteria from the genera: *Legionella, Mycobacterium*, *Pseudomonas*, *Acinetobacter*, and also ameba, such as *Acanthamoeba*. The common features of these bacteria are resistance to disinfection, adhesion and biofilm formation on the pipes, survival within ameba, and growth in modest nutritional conditions. Also, these bacteria increasingly lead to the development of infections related to health care (hospital infection). Despite the implementation of preventive and anti-epidemic measures, infections caused by these bacteria are becoming more frequent, and new approaches and methods for their removal from the water are necessary.

Key words

water quality, opportunistic pathogens in the water supply system, biofilm

RADIOAKTIVNOST PITNIH VODA IN HRANE

DRINKING WATER AND FOOD RADIOACTIVITY

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dr. Jasmina **KOŽAR LOGAR**, uni. dipl. fiz.

Ključne besede

radioaktivnost, pitna voda, hrana, zdravje prebivalstva

Povzetek

V človekovem okolju je veliko naravnih radioaktivnih izotopov. Večina kemijskih elementov ima namreč vsaj kakšen radioaktiven izotop. Razlikujejo se po izsevani energiji in načinu razpada atoma, s tem pa tudi po dosegu, v katerem izsevani delec oziroma energija lahko povzroči škodo. Meritve aktivnosti radioaktivnih izotopov so tako še posebej pomembne, ko gre za pitno vodo in hrano, saj lahko kljub krajšemu dosegu izotopi, vgrajeni v specifične občutljive dele bioloških tkiv, naredijo sorazmerno veliko škodo. Na podlagi zakonodaje na področju varstva pred ionizirajočimi sevanji v Sloveniji že vrsto let nadzorujemo vsebnost radioaktivnih izotopov. Namen rednih monitoringov je zmanjšanje tveganja za zdravje prebivalcev zaradi radioaktivne kontaminacije okolja. Še posebej je zanimivo človekovo okolje v okolici nuklearnih objektov, kot na primer v okolici našega največjega jedrskega objekta, Nuklearne Elektrarne Krško (NEK), kjer je pričakovati povišane aktivnosti umetnih radioaktivnih izotopov. Večletne meritve kažejo, da je kontaminacija pitne vode in hrane zaradi nuklearne industrije v Sloveniji zanemarljiva. Ker so uporabljene jedrske analizne metode zelo natančne, lahko ob pravilni interpretaciji podajo še dodatne informacije o kroženju nutrientov, ranljivosti vodnega telesa in podobno.

Institut "Jožef Stefan" /
Jožef Stefan Institute
Ljubljana, Slovenija

Abstract

Almost all chemical elements have at least one radioactive isotope. Naturally occurring radioactive isotopes are therefore part of human environment. Differences among them are mainly in decay scheme and corresponding decay energy what affects also the distance on which the damage in biological tissue might occur. Therefore special attention is given to the drinking water and food where due to ingestion and internal radiation some isotopes can make greater damage compared to external radiation. In accordance to national legislation, radioactive isotopes activities have been monitored already for several years. Possible effects on human health are evaluated with principles of ALARA (as low as reasonable achievable) in mind. Nuclear facilities are of special interest since higher levels of man-made radioactive isotopes are anticipated. In Slovenia the largest nuclear facility is Krško Nuclear Power Plant (KNPP) where majority of our activities take place. Several years of drinking water and food monitoring programmes show negligible contamination due to nuclear activities in Slovenia. Long data sets of precise measurements of wide range of radionuclides give us a possibility to obtain additional information regarding nutrient cycle, groundwater vulnerability etc.

Key words

radioactivity, drinking water, food, human health

NOVOSTI NA PODROČJU PREHRANSKIH RAZISKAV

NOVELTIES IN THE FIELD OF NUTRITION RESEARCH

doc. dr. Matej **GREGORIČ**, dipl. san. inž.

Ključne besede

prehranske študije, prehranska ocena, prehranska orodja, EFSA EU Menu

Nacionalni inštitut za javno zdravje / National Institute of Public Health Ljubljana, Slovenija

Povzetek

Tako kot se na nivoju novih prehranskih izdelkov kaže inovativnost in razvoj novih tehnologij, tako se kažejo potrebe po razvoju tudi na področju prehranskih ocen. Danes je jasno, da je s prehrano možno neposredno vplivati na presnovne funkcije, telesno sestavo in fiziološke dejavnike tveganja, s tem pa na pojav in izide bolezni. Paradoksalno se naše znanje o živilih in prehrani nenehno širi, po drugi strani pa so povezave med prehrano in zdravjem zelo kompleksne in težko razumljive.

V primerjavi z ostalimi vedenjskimi dejavniki (kot je npr. kajenje) je prehranjevanje (zlasti v populaciji) zelo težko meriti. Vsak posameznik je "izpostavljeni" hrani, med seboj se razlikujejo glede vrste in zaužitih količin hrane, poleg tega se ti kompleksni prehranskih vzorci dnevno spreminjajo. Sočasno ugotavljanje posameznih prehranskih determinant v povezavi s podatki o prehranskem statusu in zdravstvenem stanju, njihovo vrednotenje oz. primerjanje teh vplivov med seboj, predstavlja velik izziv. Poznamo tudi že kar nekaj biomarkerjev, povezanih z načinom prehranjevanja, vendar pa njihovo vrednotenje prav tako ni enostavno. Zato je prehransko spremljanje na ravni posameznika, v obliki dobro zasnovanih intervjujev, še vedno izredno pomembno. Tako zbrani podatki predstavljajo nujno komponento v prehranski oceni ali oceni tveganja na področjih, ki so povezana z varnostjo živil. Ker vse skupine (npr. dojenčke, starejše) ni mogoče enako prehransko spremljati, so potrebni tudi vse bolj prilagojeni pristopi. Za razliko od frekvenčnih vprašalnikov, ki so bili v preteklosti pogosto v uporabi in povzročali številne napake v ocenah, so danes v ospredju pristopi prehranskega dnevnika in zapisa jedilnika prejšnjega dne. V tej smeri se razvijajo tudi številne informacijske rešitve (npr. aplikacije za lažjo izbiro primernih živil, vodenje in analiza prehranskega dnevnika), ki bodo olajšale zbiranje in pohitrile analizo podatkov. Projekt "SI.Menu 2017" je nastal na po-

budo Evropske agencije za varnost hrane, z namenom standardizacije pristopa prehranskih raziskav z evropsko metodologijo. Ob tem so nastala številna orodja, ki omogočajo tudi spletno izvajanje ali izvajanje preko mobilnih aplikacij.

Abstract

As the level of new food products shows the innovativeness and development of new technologies, the need for development also appears in the field of nutritional assessments. Nowadays, it is clear that nutrition can directly influence metabolic functions, body composition and physiological risk factors, and thus the onset and outcome of the disease. Our knowledge of food and nutrition is paradoxically constantly expanding, and on the other hand, the links between diet and health are very complex and difficult to understand.

In comparison with other behavioral factors (such as smoking), is food consuming (especially in the population) very difficult to measure. Each individual is "exposed" to food, differing in relation to the type and amount of food consumed, and in addition, these complex diet patterns are changing daily. Individual data on food consumption in connection with data on nutritional status and health status is difficult to evaluate and comparing their influences to each other presents a major challenge. There are also several biomarkers associated with dietary habits, but their evaluation is also not easy. Therefore, dietary assessment at the individual level, in the form of well-designed interviews, is still extremely important. Collected information thus constitutes an essential component in the nutrition assessment or risk assessment in areas related to food safety. Since no groups (e.g. infants, the elderly) can be monitored equally, more and more customized approaches are needed. Unlike food frequency questionnaires, which were frequently used in the past and caused a number of errors in estimates, food diary and 24-hours recall methods are at the forefront today. In this direction, a number of information solutions (e.g. app for healthier food choices, food diary app) are being developed, which will facilitate the collection and speeding up of data analysis. The "SI.Menu 2017" project was launched on the initiative of the European Food Safety Authority, with the aim of standardizing the approach of national dietary studies with the European methodology. In addition, a number of aims and tools that enable computer assisted or mobile assisted personal dietary interviews have been created.

Key words

nutrition studies, nutrition assessment, nutrition tools, EFSA EU Menu

INTEGRALNO VREDNOTENJE TVEGANJ PRI ZAGOTAVLJANJU VARNIH ŽIVIL

INTEGRAL EVALUATION OF HAZARDS IN FOOD SAFETY ASSURANCE SYSTEM

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Ključne besede

varnost živil, HACCP, dobre prakse, živilsko prehransko oskrbovalna veriga, zaposleni pri delu z živili, potrošniki, izobraževanje

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Povzetek

Iz dosedanjih raziskav je razbrati dvom o učinkovitosti sistema HACCP (Hazard Analysis and Critical Control Points System), vendar si avtorji niso povsem enotni o vzrokih neučinkovitosti. Z namenom ugotoviti dejansko stanje obvladovanja varnosti živil v živilsko/prehransko/oskrbovalni verigi je uporabljen kombiniran metodološki pristop. Meta-analiza dokumentacijskih virov o vzrokih ovir pri implementaciji sistema HACCP kaže, da imata največji faktor vpliva na učinkovitost sistema HACCP oviri nezadostno usposabljanje zaposlenih in človeški viri. Na vseh analiziranih stopnjah verige so ugotovljene pomanjkljivosti pri razumevanju in obvladovanju mikrobioloških tveganj. Med elementi, ki vplivajo na učinkovitost sistema HACCP so ugotovljeni dejavniki, ki pomembno vplivajo na vedenje zaposlenih pri delu z živili in so povezani z organizacijsko klimo v podjetju, stopnjo zadovoljstva z delom, delovnimi pogoji ter z medosebnimi odnosi na delovnem mestu. Zaposleni pri delu z živili dela vedno ne izvajajo po zahtevah dobrih praks, kar nakazuje potrebo po reorganizaciji sedanjega načina usposabljanja in opozarja na pomanjkanje usposobljenih in kompetentnih strokovnjakov na obravnavanem področju. Delovno okolje in človeka, ki vstopa v verigo je potrebno obravnavati enakovredno kot ostale dejavnike tveganj. Potrošniki so nezadostno informirani o načinih varne priprave hrane doma. Predlagana Dobra prehranska praksa združuje vse sisteme dobrih praks in postavi v enakovreden položaj potrošnika ter jasno opredeli novo dimenzijo tveganj pri zagotavljanju varnih živil, t.i. človeški faktor. Na področju živilstva je potreben učinkovitejši sistem primarnega in vseživljenjskega izobraževanja.

Abstract

From the earlier researches it is understandable that efficiency of the Hazard Analysis and Critical Control Points (HACCP) System, is questionable, but the authors have different opinions about reasons of ineffectiveness. The aim of the research is to determine the actual state of food safety management in all stages of food supply chain. Mix-method approach was used. Meta-analysis of scientific and technical papers discussing reasons for barriers in HACCP system implementation shows human resources and insufficient training have the biggest impact on HACCP system efficiency. Deficiencies in understanding and controlling microbiological hazards were found out in all the analyzed stages of the chain. Factors, importantly influencing employees' behaviour during food handling were determined among the elements, which have impact on HACCP system efficiency. These factors are connected with organisational climate in a company, job satisfaction, working conditions and relationships between co-workers. Food handlers do not always follow good practices principles. This indicates the need of current training techniques modification and points out the lack of trained and competent experts in the discussed field. The need for discussing of work environment and an individual in the food supply chain equally as other hazards is exposed. Consumers are not sufficiently informed about food safety assurance at home. The proposed Good Nutritional Practice combines all the good practice systems, puts a consumer in the equal position and clearly defines a new hazard dimension, the so-called human factor, in food safety assurance. More effective system of primary education and lifelong learning of food related topics are needed.

Key words

food safety, HACCP, good practices, food supply chain, food handlers, consumers, education

PREHRANSKA PISMENOST NA PODROČJU ZAGOTAVLJANJA VARNOSTI HRANE

FOOD LITERACY IN THE FIELD OF FOOD SAFETY

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Ključne besede

prehranska pismenost, varna hrana, zaposleni, izobraževanje

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Povzetek

Hrana mora biti varna, vsebovati mora ustrezna hranila in potrošniku na trajnostni način omogočati ohranitev dostojanstva in kulturne identitete. Za obvladovanje tveganj vzdolž živilsko-prehransko-oskrbovalne verige potrebujemo zaposlene, ki imajo ustrezno znanje in veščine, so odgovorni pri opravljanju svojega dela, imajo ustrezen odnos do dela in spoštujejo načela etike. Nepoznavanje, nezavedanje in/ali neupoštevanje osnovnih pravil zagotavljanja varnosti in kakovosti živil lahko resno ogrozi javno zdravje. Namen prispevka je opredeliti elemente pismenosti na področju zagotavljanja varne hrane in analizirati stanje med bodočimi poklicnimi delavci vzdolž živilsko-prehransko-oskrbovalne verige ob koncu njihovega formalnega izobraževanja. Analiza, izvedena na ravni formalnega izobraževanja poklicnih delavcev v živilski dejavnosti, kaže pomanjkljivosti v znanju glede ključnih elementov sistema za zagotavljanje varnosti hrane (živil) in potrebo po večjih kompetencah posameznika, ki se bodo odražale tako v njegovem zavedanju odgovornosti do dela, ki ga opravlja, kot tudi v odnosu do zagotavljanja varnosti hrane. Posebno pozornost je treba posvetiti izvajalcem izobraževanj in usposabljanj (teoretičnih in praktičnih) ter opredeliti minimalne standarde, ki jih mora izpolnjevati izvajalec izobraževanja in/ali usposabljanja.

Abstract

Food must be safe, it must contain appropriate nutrients and allow the consumer, in a sustainable manner, to preserve dignity and cultural identity. In order to manage the hazards along the food supply chain we need employees who have the appropriate knowledge and skills, are responsible for doing their job, they have an appropriate attitude to work and respect the principles of ethics. Ignorance, unconsciousness and/or failure to comply with the basic rules for ensuring food safety and food quality can seriously undermine public health. The aim of the paper is to define the elements of literacy in the food safety field and to analyze the situation among future food handlers along the food supply chain at the end of their formal education. The analysis carried out at the level of formal education of professionals in food business shows a lack of knowledge about the key elements of the food safety system assurance and the need for greater individual competencies that will reflect both: their awareness and responsibility of their work regarding food safety. Special attention should be paid to education and training providers (theoretical and practical) and to define the minimum standards that the education and/or training provider must meet.

Key words

food literacy, food safety, employee, education

BOLNIŠNIČNO OKOLJE: TRENDI, NAČRTOVANJE IN MOŽNOSTI IZBOLJŠAV

HOSPITAL ENVIRONMENT: CURRENT TRENDS, DESIGN AND IMPROVEMENTS

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Ključne besede

bolnišnica, načrtovanje, kakovostno notranje okolje, priporočila

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Povzetek

Direktiva 2012/27/EU o energetski učinkovitosti navaja, da se od leta 2014 vsako leto prenovi 3 % skupne tlorisne površine stavb v lasti in rabi osrednje vlade. EPBD 2010/31/EU o energetski učinkovitosti stavb navaja, da so do konca leta 2020 vse nove stavbe skoraj nič-energijske, in so po koncu leta 2018 vse nove stavbe, ki jih javni organi uporabljajo kot lastniki, skoraj nič-energijske. Omenjene zahteve so prenesene v nacionalni pravni red in so zahtevane tudi za bolnišnične stavbe. Po statističnih podatkih EU so bolnišnice eden izmed največjih porabnikov energije v razredu nestanovnovanskih stavb. Tako predstavljajo prioritetna okolja v mednarodnih in nacionalnih strategijah in akcijskih načrtih za izboljšanje energijske učinkovitosti. *Značilnost obsežnih prenov je v smeri enostranskih rešitev, ki se pogosto odrazijo v poslabšanju kakovosti notranjega okolja. Raziskave dokazujejo, da ima slaba kakovost notranjega okolja negoden vpliv na uporabnike. Potreben je nov pristop in sistem, ki omogoča doseg optimalnih razmer. Namen prispevka je predstaviti metodologijo načrtovanja bolnišničnega okolja in sistema, ki se odrazi v kakovostnem notranjem okolju, ob varovanju okolja in minimalni možni rabi energije za delovanje stavbe.* Metodologija načrtovanja bolnišničnega okolja sledi osnovnim principom inženirskega načrtovanja. Sistem za doseg kakovostnega notranjega okolja je bil zasnovan in testiran v tesni in modelni sobi. Delovanje je bilo primerjano s konvencionalnim sistemom ogrevanja in hlajenja. Rezultati meritev izbranih parametrov notranjega okolja in simulacije odziva uporabnika dokazujejo, da razvit sistem ustvari optimalne, zdrave in udobne razmere. Konvencionalni sistem tega ne omogoča. Izdelana priporočila se uporabijo kot vodila za načrtovanje stavb ter za izboljšave na področju zakonodaje.

Abstract

Directive 2012/27/EU on energy efficiency defines that from 1st January 2014, 3 % of the total floor area of buildings owned by central government must be renovated each year. EPBD 2010/31/EU on energy efficiency of buildings defines that all new buildings must be nearly zero-energy by the end of 2020; and all new public buildings must be nearly zero-energy by 2018. Defined requirements are implemented into national legal acts on energy efficiency and required for hospitals. According to the statistical data, hospitals presents the largest non-residential buildings that consume 10 % of final energy use in non-residential buildings in Europe. As such, they are priority environments in the international and national strategies and plans to increase the energy efficiency. A current one-sided design approach results in inadequate indoor environmental quality. *Studies showed that inadequate indoor conditions often results in negative health related outcomes.* Transition to novel approach strategies and systems that enable to create optimal conditions is needed. The purpose of our work is to present the methodology of design of hospital environment and system which reflects in the qualitative indoor environmental conditions, besides minimal possible energy use. *Designed methodology follows the basic principles of engineering design. The system for indoor environmental quality was designed and tested in a test and model hospital room.* The functioning was compared to the conventional heating and cooling system. Results of the measurements and simulation of showed that the developed system enables to create optimal healthy and comfortable conditions. Conventional system does not enable to attain that. Recommendations can be used as a guideline for building design and making improvements in current legislation.

Key words

hospital, design, indoor environmental quality, recommendations

HRUP KOT DEJAVNIK TVEGANJA PRI VZGOJNEM OSEBJU V VRTCU

NOISE AS A RISK FACTOR FOR KINDERGARTEN STAFF

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Ključne besede

izpostavljenost hrupu, vzgojno osebje, kortizol v slini, delovno okolje

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Povzetek

Pomemben stresni dejavnik zaposlenih predstavlja izpostavljenost hrupu, tudi v neindustrijskih delovnih okoljih. Namen je bil ugotoviti povezavo med izpostavljenostjo vzgojnega osebja hrupu na delovnem mestu in doživljanjem stresa. Izbranemu vzgojnemu osebju smo odvzeli vzorce sline za določanje koncentracije stresnega hormona kortizola na delovni in dela prost dan (med vikendom). V delovnem dnevu smo pri izbranih zaposlenih izvedli tudi meritve hrupa. Z univariatno linearno regresijsko analizo smo ugotavljali povezanost razlik v spremembah koncentracije kortizola in jakosti izmerjene ekvivalentne ravni hrupa v delovnem okolju vzgojnega osebja. Povezanost med koncentracijo kortizola in izmerjenimi ravnmi hrupa smo ocenjevali z univariatno in multiplo metodo logistične regresijske analize ob upoštevanju potencialnih motečih dejavnikov. Sprememba koncentracije kortizola na dela prost in delovni dan je statistično značilno različna ($p < 0{,}001$), kar nakazuje, da hrup, ki je bil obravnavan kot edini merjeni stresni dejavnik na delovni dan, povzroča stres pri vzgojnem osebju. Ravni hrupa na delovnem mestu vzgojnega osebja vplivajo na koncentracijo stresnega hormona kortizola. Ugotovili smo, da je hrup pomemben stresni dejavnik vzgojnega osebja na delovnem mestu. Z novim metodološkim pristopom smo povezovali problematiko izpostavljenosti hrupu in stresu v delovnem okolju vzgojnega osebja. V Sloveniji in širše v neindustrijskem delovnem okolju gre za prvo tovrstno povezavo pri vzgojnem osebju v vrtcu. Izbor udeležencev v študiji smo izvedli na način, ki do sedaj še ni bil obravnavan. Meritve ravni kortizola pri udeležencih smo izvedli z vzorčenjem sline, kar predstavlja neinvazivno in manj stresno metodo. Z obvladovanjem in zmanjšanjem okoljskih in družbenih dejavnikov tveganja v delovnem okolju vrtca bi lahko pripomogli k zmanjšanju stresa pri vzgojnem osebju.

Abstract

Exposure to noise is an important stress factor for employees even in non-industrial working environments, such as educational facilities. The aim of our study was to establish a link between experiencing stress and the workplace noise exposure for kindergarten staff. Saliva samples were taken from the selected kindergarten teachers during the working day and during a day off work (during the weekend) to determine the levels of the stress hormone cortisol. We also conducted noise measurements for the selected employees during the working day. We evaluated the association between the levels of the stress hormone cortisol and measured equivalent noise level using a univariate and multiple logistic regression analysis taking into consideration potential confounders. Changes in cortisol during the working and the non-working day were statistically significantly different ($p < 0.001$), which shows that noise as the only considered stress factor during a working day is a stress-causing factor to kindergarten staff. The measured equivalent noise levels in the workplace have an effect on cortisol levels. We found that noise is a major stress factor in the workplace for kindergarten staff. Using a new methodological approach, we established a link between noise exposure and stress in the kindergarten staff's working environment. In non-industrial working environments in Slovenia and beyond, this is the first such link established for kindergarten staff. The selection of participants in the study was carried out in a new and previously unexplored manner. Controlling and reducing environmental and social risk factors in kindergartens could help reduce stress in kindergarten staff.

Key words

noise exposure, kindergarten staff, saliva cortisol, workplace

VLOGA SANITARNEGA INŽENIRSTVA V INŠTITUTIH ZA JAVNO IN OKOLJSKO ZDRAVJE

ROLE OF SANITARY ENGINEERING IN INSTITUTES FOR PUBLIC AND ENVIRONMENTAL HEALTH

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Ključne riječi

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Sažetak

Danas je gotovo nezamisliva kadrovska struktura zavoda za javno zdravstvo bez zdravstvenih radnika djelatnosti sanitarnog inženjerstva. U ovom radu dana je definicija zdravstvenih radnika djelatnosti sanitarnog inženjerstva kao multidisciplinarne struke i uloga zavoda za javno zdravstvo u Republici Hrvatskoj kao zdravstvenih ustanova za obavljanje javnozdravstvene djelatnosti na području županija. Prikazan je kratki povijesni pregled te obrazovanje svih stručnih sprema zdravstvenih radnika djelatnosti sanitarnog inženjerstva kao i regulacija profesionalnog statusa. Posebno je objašnjena uloga sanitarnog inženjerstva u pojedinima organizacijskim jedinicama zavoda za javno zdravstvo kako kroz pripravnički staž tako i u daljnjem radu u sustavu javnog zdravstva. I na kraju, za izliječit bolest je potreban liječnik, ali za spriječiti bolest potreban je sanitarac!

Abstract

Today, the stuff structure of the Public health Institute is unimaginable without healthcare workers in sanitary engineering. This paper presents the definition of healthcare workers in the field of sanitary engineering as a multidisciplinary profession and the role of the public health institute in the Republic of Croatia as health institutions for performing public health activities in the counties. A brief historical review is presented, as well as the education of all professional qualifications of healthcare workers in the field of sanitary engineering and regulation of professional status. Particularly explained is the role of sanitary engineering in some of the organizational units of public health institutes through internship and in further work in the public health system. And finally, a cure for a disease is needed by a doctor, but to prevent the disease, a sanitary engineer is needed!

Key words

healthcare workers of sanitary engineering, public health institute

PRIMER IZDELAVE OCENE TVEGANJA ZA ZDRAVJE ZARADI IZPOSTAVLJENOSTI STRANSKIM PRODUKTOM DEZINFEKCIJE UPORABNIKOM DVORANSKIH PLAVALNIH BAZENOV

EXAMPLE OF THE HEALTH RISK ASSESSMENT ON THE USERS OF THE INDOOR SWIMMING POOLS DUE TO EXPOSURE TO DISINFECTION BY-PRODUCTS

izr. prof. dr. Borut **POLJŠAK**, dipl. san. inž.

Ključne besede

kloroform, ocena tveganja plavalci, dvoranski bazeni, izpostavljenost

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Povzetek

Izdelana je bila ocena tveganja za dolgodobno izpostavljenost kloroformu pri uporabnikih dvoranskih bazenov s sladko vodo, ki kot sredstvo za dezinfekcijo uporabljajo klorovo sredstvo in iz katerega se nato tvori kloroform. Preučili smo tri glavne poti izpostavljenosti kloroformu: (1) ingestija bazenske vode, (2) inhalacija zraku dvoranskega bazena in (3) dermalni kontakt z absorpcijo preko kože. Na podlagi razpoložljivih podatkov smo ovrednotili vse faze ocene tveganja: (1) identifikacijo dejavnika tveganja, (2) analiziali nevarnost kemikalije, (3) ocenili odziv na odmerek, (4) ocenili izpostavljenost ter (5) ocenili tveganje ob različnih scenarijih izpostavljenosti po mednarodno uveljavljeni metodologiji, ki smo jo v določenih vsebinah smiselno modificirali. Ugotovili smo, da je tveganje pri vseh scenarijih izpostavljenosti kloroformu bistveno večje preko inhalacije zraku dvoranskega bazena kot tveganje zaradi ingestije bazenske vode ali absorpcije kloroforma preko kože. Izračunana tveganja so bila pri vseh scenarijih inhalacijske izpostavljenosti večja od sprejemljivega tveganja (tveganje 1/100.000). Izračunano tveganje je bilo najvišje pri scenariju tekmovalnih plavalcev. Ugotovili smo, da je bilo tveganje za več kot 1000x večje od še sprejemljivega tveganja tudi pri scenariju, ko smo za izračun izpostavljenosti tekmovalnih plavalcev uporabili podatke ene študije, kjer so opravljali vzorčenja in meritve koncentracij kloroforma (oz. TTHM) v bazenski vodi in v zraku dvoranskega bazena tik nad vodno gladino. Rezultati izračunanih tveganj zaradi izpostavljenosti kloroformu v različnih scenarijih izpostavljenosti uporabnikov dvoranskih bazenov kažejo, da je tveganje zaradi inhalacije zraku v slovenskih dvoranskih konvencionalnih bazenih s sladko vodo še posebej problematično. V bodoče bo potrebno bolje preučiti in nadzorovati kemična tveganja pri inhalacijski izpostavljenosti v dvoranskih bazenih, s poudarkom na zmanjševanju tveganj, povzročenih s kloroformom, trihalometani ali ostalimi lahkohlapnimi stranskimi produkti kloriranja.

Abstract

The purpose of the presented research is to prepare a health risk assessment for long-term exposure to chloroform in freshwater indoor swimming pools which use chlorine as a disinfectant from which the chloroform is formed. There are three main routes of exposure to chloroform in the indoor swimming pools: (1) ingestion of swimming pool water, (2) inhalation of the indoor air, and (3) dermal contact and absorption through the skin. Based on the available data, we evaluated all stages of the risk assessment: (1) hazard identification, (2) hazard characterization, (3) dose-response assessment, (4) exposure assessment and (5) risk characterization under the different exposure scenarios according to the internationally established methodology, which was modified in certain contents in a meaningful way. We found that the risk in all scenarios for inhalation exposure to chloroform is significantly higher than the risk due to water ingestion or absorption through the skin. In all scenarios for inhalation exposure, the calculated risks were greater than the acceptable risk (1/100,000). The calculated risk was highest for competitive swimmers. We found that the risk was more than 1000x greater than the acceptable risk when calculating the exposure scenario for competitive swimmers and where the data of sampling and measurements of chloroform (or TTHM) concentrations in pool water and in the indoor air just above the water surface was used. The results of calculated risks due to exposure to chloroform under different exposure scenarios of indoor swimming pool users show that the inhalation risks in Slovenian conventional freshwater indoor swimming pools is particularly problematic. In the future, it will be necessary to better examine and control the chemical risks from inhalation exposure in the indoor swimming pools, with the focus on methods aimed to reduce the risks of exposure to chloroform, trihalomethanes or other chlorination by-products.

Key words

chloroform, risk assessment swimmers, indoor swimming pools, exposure

PREVENCIJA BOLNIČKIH INFEKCIJA

PREVENTION OF HOSPITAL-ACQUIRED INFECTIONS – CASE STUDY

Jasna **STOJANOVIĆ**, dipl. san. inž.

Ključne riječi

prevencija, bolničke infekcije, zdravstvenoj ustanove, higijena

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Clinical Centre Niš, Republic of Serbia

Rezime

Bolnička sredina može biti osnova za nastanak bolničkih infekcija pa je stoga neophodno strogo voditi računa o održavanju higijene radi sprečavanja i suzbijanja zaraznih bolesti.

Higijena zdravstvenih ustanova podrazumeva skup svih mera i postupaka koje treba sprovoditi u cilju zaštite zdravlja bolesnika, odnosno, posetioca, zaštite zdravlja zaposlenog osoblja i zaštite šire i bliže okoline zdravstvenih ustanova.

Potencijalna opasnost za pacijente:

- Bolničke infekcije
- Neadekvatni mikroklimatski uslovi bolničke sobe
- Neadekvatna ishrana
- Stresogene situacije

Zakonom o zaštiti stanovništva od zaraznih bolesti koje ugrožavaju celu zemlju, predviđen je i obavezan epidemiološki nadzor nad bolničkim infekcijama.

Preduslov za uspešno obavljanje nadzora, koje pruža mogućnost uspešne prevencije i suzbijanja bolničkih infekcija je dosledno korišćenje jedinstvenih, međunarodno priznatih definicija bolničkih infekcija.

Jedna infekcija smatraće se bolničkom:

- Ako je nastala u bolnici i postala evidentna 48 časova (tipičan inkubacioni period za većinu bakterijskih bolničkih infekcija) posle prijema pacijenta u bolnicu ili kasnije.
- Ako se utvrdi da je povezana sa hirurškom intervencijom, a ispolji se u toku 30 dana posle hirurške intervencije u slučaju da implatant nije ugrađen ili u toku jedne godine ako je ugrađen.
- Ako se ispoljila posle otpusta pacijenta iz bolnice, a epidemiološki podaci pokazuju da je nastala u bolnici
- Ako je nastala u novorođenčeta kao rezultat prolaza kroz porođajni kanal majke.

Svaka infekcija mora biti individualno procenjena kako bi se dokazala njena povezanost sa hospitalizacijom.

Otkrivanje bolničkih infekcija se sprovodi pregledom dnevnih nalaza o izolaciji uzročnika u mikrobiološkoj laboratoriji, pregledom medicin-

ske dokumentacije pacijenata, pregledom pacijenata i razgovorom sa osobljem zdravstvene ustanove.
Prevencija i suzbijanje bolničkih infekcija predstavlja skup aktivnosti u oblasti bezbednosti pacijenata tokom pružanja zdravstvene zaštite kao i bezbednosti zaposlenih lica. U sprovođenju tih aktivnosti odgovorni su svi zaposleni u zdravstvenoj ustanovi.

Nešto što nije očišćeno, ne može biti dezinfikovano i/ili sterilisano!

■ Abstract

The hospital environment can be the basis for the emergence of hospital-acquired infections, therefore, it is necessary to maintain good hygiene in order to prevent and combat infectious diseases.
The hygiene of healthcare facilities implies a set of measures and procedures to be implemented in order to protect the health of patients, visitors, staff and the environment of the facility in question.
Potential danger to patients:

- Hospital-acquired infections
- Inadequate microclimate conditions in hospital room
- Inadequate nutrition
- Stressful situations

The Law on the Protection of Population from Infectious Diseases provides for mandatory epidemiological surveillance of hospital-acquired infections. The precondition for successful surveillance, which enables successful prevention and suppression of hospital-acquired infections, is the consistent use of unique, internationally recognized definitions of hospital-acquired infections.
An infection is considered hospital-acquired:

- If it appears in the hospital and becomes evident 48 hours (typical incubation period for the majority of hospital-acquired infections) after the admission of patient to hospital or later.
- If it is associated with a surgical intervention and appears within 30 days after the surgery if there is no implant or within one year if there is an implant.
- If it appears after the discharge of patient from hospital and the epidemiological data show that it emerged in hospital.
- In infants, if it is acquired during the passage through the maternal birth canal.

Each infection has to be individually evaluated in order to prove its association with hospitalization.
A hospital-acquired infection is detected by examining daily results on the isolation of the causative agent in the microbiology laboratory, reviewing the patient's medical records, examining the patients, and interviewing the hospital staff.
Prevention and suppression of hospital-acquired infections is a set of activities in the field of patient safety while providing health care, as well as the safety of the staff. All the employees are responsible for the implementation of these activities.

What is not cleaned cannot be disinfected and/or sterilized!

■ Key words

prevention, hospital-acquired infections, healthcare facilities, hygiene

ORODJA ZA OPTIMIZACIJO PROCESOV HIGIENE V ZDRAVSTVU

TOOLS FOR OPTIMIZING THE HYGIENE PROCESS IN HEALTH CARE

Vesna **JURKOŠEK**, dipl. san. inž.

Ključne besede

programi, higiena v zdravstvu, stroški

Povzetek

Uvod: Doktrina preprečevanja okužb povezanih z zdravstveno dejavnostjo mora slediti sodobnemu razvoju medicinske znanosti in še hitrejšemu prilagajanju mikroorganizmov. **Povzetek:** Vodstva bolnišnic so pred velikim izzivom – kako z omejenimi sredsvi zagotovoti pacientom in zdravstvenim delavcem varno okolje. V bolnišničnem okolju obstaja tveganje za prenos povzročiteljev okužb preko rok, inštrumentov, pripomočkov in površin. Celosten programski pristop zagotavlja optimalno higieno z minimalno porabo časa, energije in stroškov ter zajema vsa ključna področja prenosa povzročiteljev okužb. Celosten pristop povezuje tehnologije, storitve, strokovno znanje in izkušnje z usposabljanjem in informacijami. Vključuje jasna navodila, predlagani so ustrezni materiali in pripomočki, vključen je monitoring spremljanja higiene in korektivni ukrepi za doseganje zastavljenega cilja. Programi se izvajajo v več fazah: povzetek izhodiščnega stanja predstavlja osnovo za nadaljnje procese; na osnovi zbranih informacij se oblikujejo predlogi za optimizacijo iz katerih se pripravi program izvajanja, ki se skozi monitoring redno spremlja in sledi napredku. **Zaključek:** Celoviti programski pristopi, so podlaga za zmanjšanje tveganje za prenos okužb in hkrati zagotavljajo zniževanje in optimizacijo stroškov.

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Abstract

Introduction: The doctrine of preventing infections associated with medical activity should be followed by the development of modern medical science and accelerate the adaptation of microorganisms.
Abstract: Hospital management is facing a major challenge – how, with limited resources, to provide a safe environment for patients and healthcare professionals. Hospital environment risks transmitting infectious agents via hands, instruments, devices and surfaces.
An integrated programmatic approach ensures optimal hygiene with minimal time, energy and cost, and covers all the key areas of transmission of infectious agents. An integrated approach combines technologies, services, expertise and experience with training and information. It includes clear instructions, proposes appropriate materials and accessories, introduces the monitoring of hygiene control, as well as corrective measures for achieving the target. Programs are implemented in several stages: the baseline is the foundation for further processes; based on collected information optimization proposals are drawn up, from which a program of implementation is then prepared, which is regularly controlled through the monitoring and follows the progress. **Conclusion:** Comprehensive programmatic approaches are the basis for reducing the risk of transmitting infections while ensuring cost reduction and optimization.

Key words

programs, hygiene in health care, costs

VPLIV IZVEDENIH SANACIJSKIH UKREPOV V TE ŠOŠTANJ NA KAKOVOST ZUNANJEGA ZRAKA

IMPACT OF ŠOŠTANJ THERMAL POWER PLANT REHABILITATION ON THE AMBIENT AIR QUALITY

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Andrej **ŠUŠTERŠIČ**[1], univ. dipl. inž. str.
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Ključne besede

termoelektrarna Šoštanj, lignit, najboljša razpoložljiva tehnologija, emisije snovi v zrak, kakovost zunanjega zraka

Povzetek

Na lokaciji Termoelektrarne Šoštanj že več kot 62 let poteka proizvodnja električne energije iz lignita. Z vidika onesnaževanja zraka je bilo v preteklih obdobjih problematično onesnaževanje s prahom, žveplovim dioksidom in dušikovimi oksidi, ki so povzročali predvsem propadanje gozdov. Sanacijski ukrepi, ki so sledili zavezujočim mednarodnim konvencijam in protokolom ter predpisom, ki neposredno postavljajo okoljske pogoje obratovanja velikih kurilnih naprav ter določajo standarde kakovosti zunanjega zraka, so bili usmerjeni v izboljšanje odpraševanja dimnih plinov ter njihovo razžveplanje in denitrifikacijo. Ustavitev obratovanja tehnološko zastarelih in ekonomsko nerentabilnih blokov je zahtevala gradnjo nadomestnega bloka 6. Nova enota temelji na uporabi najboljše razpoložljive tehnike, s katero dosega visoke izkoristke ter nizko stopnjo onesnaževanja zunanjega zraka in okolja kot celote. Z novim blokom ter izvedenimi sanacijskimi ukrepi na obstoječih, še delujočih napravah se je bistveno izboljšala kakovost zraka na območju vrednotenja Termoelektrarne Šoštanj ter povsem preprečilo čezmerno onesnaževanja zunanjega zraka.

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[2] Termoelektrarna Šoštanj / Šoštanj Thermal Power Plant, Šoštanj, Slovenija

Abstract

For more than 62 years Power plant Šoštanj has been generating electrical energy using lignite. During the past periods harmful environmental impacts especially on forests were observed. They were caused by dust particles, sulphur oxides and nitrogen oxides mainly discharged to the air from Power plant Šoštanj. Power plant Šoštanj implemented environmental rehabilitation measures like dedusting, desulphurization and denitrification of exhaust gases. They followed requirements of binding international conventions and protocols and other legal regulations that have been determining operating conditions of power plants and the quality of the ambient air. Decommissioning of the oldest power plants in Šoštanj due to technological obsolescence and economical inefficiency required the construction of a new unit 6. The new unit fulfills the criteria of best available techniques, is highly efficient and its environmental impacts are as low as possible. Together with reconstructed existing units that are still in operation, Šoštanj Thermal Power Plant minimized the releases to the air. The quality of ambient air has improved significantly and there is no excessive air pollution any more.

Key words

Šoštanj Thermal Power Plant, lignite, best available technology, emission to air, ambient air quality

MODELSKA OCENA – ORODJE ZA HITRO IN EFEKTIVNO DOLOČANJE UKREPOV NA PODROČJU ZUNANJEGA ZRAKA

MODELLING ASSESSMENT – FAST AND EFFECTIVE APPROACH TO DETERMINATE MEASUREMENTS IN AIR QUALITY FIELDS

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Miha **MARKELJ**, dipl. inž. fiz.
Damjan **KOVAČIČ**, dipl. san. inž.

Ključne besede

kakovost zunanjega zraka, emisije, modelski izračuni, PM_{10}

Povzetek

Odgovornost do okolja in družbe Evropo že desetletja vodita k ustvarjanju bolj zdravega okolja. V začetnih fazah je bilo načrtovanje ukrepov lažje kot danes, saj so bili najbolj izstopajoči onesnaževalci znani. Zmanjšanje njihovega vpliva je imelo zelo velik pozitiven vpliv na kakovost zraka. Danes smo v situaciji, ko so bile vse enostavne in očitne rešitve že uporabljene, zato je načrtovanje novih in učinkovitih ukrepov mogoče le na podlagi poglobljenih raziskav. V Sloveniji imamo 7 območij, kjer je mejna vrednost koncentracij za delce PM_{10} redno presežena in so ukrepi za zmanjševanje le-teh zakonodajno določeni. Med njimi je tudi Mestna občina Celje, kjer je bilo z modelskim pristopom in upoštevanju podatkov o gostoti prometa ter meteoroloških in orografskih podatkov, ocenjeno zmanjšanje emisij iz prometa v mestnem jedru zaradi izgradnje obvoznice. Ukrep se je izkazal za učinkovitega pri zmanjševanju obremenjenosti najbolj obremenjenih delov Celja. Ugotovitve pa so namenjene usmerjanju pri nadaljnjih aktivnostih izboljšanja zraka v ožjem mestnem jedru in pri pripravi nasvetov za prebivalce in druge uporabnike mesta. Tudi posamezniki namreč lahko s poučeno izbiro vplivamo na to kakšen zrak dihajo.

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Abstract

Responsibility to environment and society lead to the healthier environment for decades in Europe. In the past, it was easier to conduct measurements than it is today, due to the knowledge of the biggest contaminators. Reductions of those had great impacts on the air quality. Today we are in the situation when all the easiest and the obvious results are already done. Due to that, planning of new and effective measurements is possible beside the deeper researches. Slovenia has 7 sensitive areas, where PM_{10} emissions are yearly exceeded and the measurements are legally defined. Among those areas is also the municipality of Celje, where it was assessed the impact of the bypass road on the air quality with the modeling approach which includes also meteorology, traffic density, and orography. The measurement was revealed as successful, especially in the most loaded parts of the city. This result will help to create better air quality politics. At least everyone has power to choose the quality of the air we breathe.

Key words

air quality, emissions, air quality calculation, particle matter

PROIZVODNJA I PREHRANA SA UMJETNIM MESOM
IN VITRO MEAT PRODUCTION AND CONSUMPTION

Marija **POLJAK**, dipl. san. inž.

Ključne riječi

umjetno meso, *in vitro* meso, mesna industrija

Sažetak

Ljudska populacija raste vrlo brzo. Predviđa se da će globalna populacija do 2050. godine dostići brojku od 9 milijardi. Kako bi osigurala dovoljne količine mesa do tog vremena mesna industrija mora povećati proizvodnju za 50-73%, a što će biti nemoguće konvencionalnom proizvodnjom. Jedno od mogućih rješenja je proizvodnja umjetnog mesa. Umjetno ili *in vitro* meso je meso dobiveno kultivacijom matičnih stanica životinja u bioreaktoru uz primjenu naprednih tehnika tkivnog inženjeringa. Razlozi zašto neki znanstvenici zagovaraju *in vitro* meso su: dobrobit životinja, zaštita okoliša i proizvodnja koja je pod strogim nadzorom. Treba naglasiti da su neki od navedenih razloga upitni, a uz to postoje i dodatne barijere koje otežavaju stavljanje umjetnog mesa na tržište kao što su: etička i moralna pitanja, visoka cijena proizvodnje *in vitro* mesa i ograničenja trenutačne tehnologije kojom se *in vitro* meso proizvodi.

Kako je 2013. godine u Londonu pripremljen i kušan prvi hamburger od umjetnog ili *in vitro* mesa ne možemo više govoriti o *in vitro* mesu kao o nečemu iz budućnosti. S obzirom na povećanje ljudske populacije, zagađenje okoliša i druge čimbenike neminovno je da će doći do promjena u mesnoj industriji. Izgledno je da će meso biti zamijenjeno *in vitro* mesom no za sada je to moguće samo u teoriji.

Nastavni zavod za javno zdravstvo dr. Andrija Štampar / Teaching Public Health Institute dr. Andrija Štampar, Zagreb, Hrvatska

Abstract

Human population is increasing rapidly. Estimation is that in the year 2050 global population will reach the number of 9 billion. By that time to feed the population meat industry needs to increase production by approximately 50-73%. That will be impossible with conventional meat production. Some see a solution in the production of artificial meat. Artificial or *in vitro* meat is meat produced by culturing the stem cells derivated from farm animals inside bioreactor by using advanced tissue engineering techniques. Reasons some scientist advocate artificial meat or *in vitro* meat are animal well fare, environment protection, and process monitoring. Some of those reasons are still questionable, and there are other barriers to entering the market for *in vitro* meat like the ethical and moral question, the high price of a product and current technological limits.

Artificial meat is no longer something from the future. In 2013 the world' s first *in vitro* meat-based burger was cooked and tasted in London. The traditional meat industry is facing a changing, and it is possible that meat is going to be replaced whit *in vitro* meat, although for now only in theory.

Key words

artificial meat, *in vitro* meat, meat industry

UTICAJ PROKUHAVANJA SIROVOG MLIJEKA NA NJEGOVU ZDRAVSTVENU ISPRAVNOST I NUTRITIVNU VRIJEDNOST

THE EFFECT OF BOILING RAW MILK ON ITS HEALTH SAFETY AND NUTRITIONAL VALUES

mr. Daniel **MAESTRO**, dipl. san. ing.

Sažetak

Uvod: Sve veći broj ljudi konzumira sirovo nepasterizovano mlijeko. Bolje nutritivne vrijednosti, sam kvalitet, okus i druge zdravstvene prednosti su zagovarane kao razlog za povećanim interesom za konzumacijom sirovog mlijeka. Međutim, naučno utemeljenih podataka da se potkrijepi ova tvrdnja su vrlo ograničeni. Gotovo sve međunarodne savjetodavne i regulatorne agencije koji se bave sigurnošću hrane, snažno podržavaju principe konzumiranja samo pasterizovanog mlijeka. Međutim, postoje i istraživanja koja podstiču na korištenje sirovog mlijeka. **Materijali i metode:** Istraživanje je provedeno na 30 uzoraka sirovog mlijeka, izabranih metodom slučajnog uzorka, uzetih kod individualnih prodavača sa sarajevskih tržnica i pijaca. Svaki prikupljeni uzorak će biti podjelen na dva djela (A i B), te će se uzorak A analizirati prije, a uzorak B nakon prokuhavanja. U prikupljenim uzorcima će se vršiti analize na parametre zdravstvene ispravnost i kvaliteta, predviđene važećom zakonskom regulativom u BiH. **Rasprava:** Rezultati analiza na zdravstvenu ispravnost sirovog mlijeka, ukazuju da sirovo mlijeko koje je dostupno na području Kantona Sarajevo, odstupa u odnosu na zakonsku regulativu. Izraženo je smanjenje broja aerobnih bakterija, kao i potpuno uništavanje enterobakterija nakon prokuhavanja, što je u skladu sa očekivanim rezultatima, baziranim na podacima iz literature u kojoj se metoda prokuhavanja mlijeka navodi kao efikasna prevencija od mogućih rizika trovanja bakterijama iz sirovog mlijeka. Prokuhavanje mlijeka nema uticaj na prisustvo mikotoksina M1 u mlijeku. Dobiveni rezultati ukazuju da prokuhavanje mlijeka snižava koncentracije olova i arsena. Prokuhavanjem mlijeka mijenjaju se njegove nutritivne karakteristike, što ide u prilog tvrdnjama onog dijela naučne populacije koji zagovara ovu hipotezu. **Zaključak:** Prokuhavanje sirovog mlijeka ima vrlo izražen i značajan uticaj na povećanje njegove mikrobiološke ispravnosti, te se poboljšava njegova zdravstvena ispravnost. Prokuhavanjem mlijeka dolazi do smanjenja

Zavod za javno zdravstvo FBiH / Institute for Public Health of FBiH, Sarajevo, Bosna i Hercegovina

sadržaja masti i bjelančevina, povećanja udjela ugljikohidrata u suhoj tvari, te ima veću energetsku vrijednost od sirovog mlijeka.

Abstract

Introduction: An increasing number of people consume raw unpasteurized milk. Better nutritional value, the quality, taste and other health benefits have been advocated as the reason for the increased interest in the consumption of raw milk. However, scientifically based information to substantiate this claim are very limited. Almost all of the international advisory and regulatory agencies that deal with food safety strongly support the principles of consuming only pasteurized milk. However, there are also studies that encourage the use of raw milk. **Materials and methods:** The research was conducted on 30 samples of raw milk, selected randomly, taken from individual sellers from the Sarajevo market and bazaar. Each collected sample will be distributed into two parts (A and B), and sample A will be analyzed before boiling, and sample B after boiling.
The collected samples will be carried out to analysis for the health safety and quality provided by the current legislation in BiH. **Results and discussion:** The results of the analysis of the safety of raw milk indicates that raw milk available in the Sarajevo Canton differ respect to legislation. The reduction in the number of aerobic bacteria is expressed, as well as completely destroying enterobacteria after boiling, which is in line with expected results based on data from the literature in which the method of boiling milk quoted as effective prevention of potential risks poisoning bacteria from raw milk. Boiling milk has no effect on the presence of mycotoxins M1 in milk. The results suggest that boiling milk lowers concentrations of lead and arsenic. Boiling milk changes its nutritional characteristics, which supports the claims of part of the scientific population who advocate this hypothesis. **Conclusion:** Boiling of raw milk has a very strong and significant impact on increasing its microbiological safety and improving its safety. Boiling milk comes to a reduction of fat and protein, increasing the proportion of carbohydrates in the dry matter, and has a higher energy value than raw milk.

POSTAVITEV NOTRANJEGA NADZORA V JAVNI OSKRBI S PITNO VODO Z IZPOSTAVLJENO PROBLEMATIKO

ESTABLISHING AND ISSUES OF INTERNAL CONTROL IN PUBLIC DRINKING WATER SUPPLY

Irena **SUŠELJ ŠAJN**, mag. san. inž.

Ključne besede

notranji nadzor, pitna voda, tehnologija obdelave pitne vode, zdravstvena ustreznost pitne vode

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Postojna, Slovenija

Povzetek

Naloga komunalnega podjetja je upravljanje z infrastrukturo, katero mu zaupa Občina, ki je navadno tudi lastnica le-te. Upravljalec mora iz tega naslova slediti zakonskim zahtevam ter doseči skladnost in zdravstveno ustreznosti pitne vode.

Skladnost in zdravstveno ustreznost pitne vode je mogoče doseči s tehnično ustrezno komunalno infrastrukturo in primernim notranjim nadzorom. Nemalokrat se zgodi, da še tako dovršen notranji nadzor ne zagotovi zdravstvene ustreznosti pitne vode in igra le vlogo zaščite uporabnika pitne vode. Temu je tako takrat, ko imamo dotrajane cevovode in neustrezno oziroma pomanjkljivo tehnologijo obdelave pitne vode. Vodni viri so v Sloveniji večinoma kraškega značaja, za njih so značilna mikrobiološka onesnaženost ter povečana motnost po večjih padavinah, saj kraški viri pitne vode, zaradi narave kraških tal, nimajo samočiščevalne sposobnosti, kot jo sicer ima podtalnica. Mednje spada tudi vodovodni sistem Postojna – Pivka, z vodnim virom Malni, kar pomeni, da sama narava vodnega vira Malni predstavlja dejavnik tveganja.

Vodni vir Malni ima široko zaledje in vplivno področje, oskrbuje 22.000 uporabnikov pitne vode v občinah Postojna in Pivka. Še do nedavnega se je obdelava pitne vode vršila skozi hitre peščene filtre, UV dezinfekcijo in dezinfekcijo s plinskim klorom. Tehnologija obdelave pitne vode je sicer, predvsem zaradi požrtvovalnosti zaposlenih in natančno izdelanim notranjim nadzorom, dosegala zakonske zahteve. Vendar so vse večje klimatske spremembe, obremenitve okolja in posledično slabšanje kvalitete surove vode botrovale k temu, da kljub vsemu trudu na dolgi rok ne bi bilo mogoče več zagotavljati zdravstvene ustreznosti pitne vode. Tako je konec leta 2017 v obstoječi obdelavi pitne vode, filtracijo s hitrimi peščenimi filtri zamenjala ultrafiltracija. Za dosego še boljših rezultatov se je tehnologijo dopolnilo tudi z uporabo aktivnega oglja in menjavo magistralnega cevovoda v dolžini preko 60 km.

Notranji nadzor v javni oskrbi s pitno vodo v podjetju Kovod Postojna d. o. o. temelji na rednem spremljanju aktivnosti, ki se dogajajo na območju zaledja vodnega vira Malni. S pomočjo analitike vzorcev vode vodnega vira pred vstopom v vodarno Malni se spremlja kako

te aktivnosti vplivajo na sam vodni vir. Sledijo redne kontrole posameznih procesov v obdelavi pitne vode, z oceno njihove ustreznosti ter kontrole pri samem uporabniku na omrežju. Ugotovljena neskladja, ali pa le slabši rezultati, so smerniki za dopolnjevanje nadzora.

Abstract

The task of a communal enterprise is the management of infrastructure, which the municipality trusts, which is usually also owned by it. The manager must follow the legal requirements from this title and achieve the compliance and health of drinking water.

The conformity and health of drinking water can be achieved through technically appropriate communal infrastructure and appropriate internal control. It often happens that even such a complete internal control does not guarantee the health of drinking water and only plays the role of protecting the drinking water user. This is the case when we have worn pipes and inadequate or inadequate drinking water treatment technology. Water resources are mostly karstic in Slovenia, characterized by microbiological pollution and increased turbidity following heavy precipitation, since the karst drinking water resources, due to the nature of karst soil, do not have self-purifying ability, as is the case with groundwater. Among them is also the water supply system Postojna – Pivka, with the water source Malni, which means that the nature of Malni water source itself is a risk factor.

Malni water source has a wide hinterland and an influential area, supplying 22,000 drinking water users in the municipalities of Postojna and Pivka. Until recently, the treatment of drinking water was carried out through rapid sand filters, UV disinfection and disinfection with gas chlorine. Although the technology of drinking water treatment was mainly due to the self-sacrifice of the employees and precisely elaborated internal control, it met the legal requirements. However, the growing climate change, the environmental burden and, consequently, the deterioration in the quality of raw water, led to the fact that, despite all the effort, in the long run, it would no longer be possible to ensure the health adequacy of drinking water. Thus, at the end of 2017, in the existing treatment of drinking water, filtration with fast sand filters was replaced by ultrafiltration. In order to achieve even better results, the technology was supplemented by the use of activated charcoal and the replacement of the main pipeline in the length of over 60 km.

Internal control in public drinking water supply at Kovod Postojna d. o. o. is based on regular monitoring of the activities taking place in the hinterland of the Malni water source. By analyzing the water samples of the water source before entering the Malni water channel, it is monitored how these activities affect the water source itself. They are followed by regular controls of individual processes in drinking water treatment, with an assessment of their suitability and control of the user on the network. The discrepancies identified, or only poorer results, are guidelines for complementing the controls.

Key words

internal control, drinking water, drinking water treatment technology, drinking water quality

FOSFATI V PITNI VODI – OCENA TVEGANJA ZA ZDRAVJE

PHOSPHATES IN DRINKING WATER – HEALTH RISK ASSESSMENT

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Ključne besede

ocena tveganja, kemično mehčanje, fosfati, pitna voda

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Povzetek

Pitna voda v Sloveniji se v sklopu kotlovnic internega vodovodnega omrežja pogosto mehča, pri čemer je razširjena uporaba fosfatov. Razlog za uporabo kemičnega mehčanja je predvsem v preprečevanju nalaganja kotlovca in s tem nižanju stroškov vzdrževanja, vpliv na zdravje pri tem ni upoštevan in je v celoti prezrt. Samega postopka apliciranja mehčal v pitno vodo se ne nadzoruje, uporabljene kemikalije niso del nadzora nad kakovostjo pitne vode in niso zajete ne v redne ne v občasne laboratorijske preiskave. Posledično o kemičnem mehčanju pitne vode nimamo dostopnih ustreznih podatkov. Zdravstvena tveganja, ki izhajajo iz kemičnega mehčanja pitne vode, niso raziskana in opredeljena. Namen prispevka je opozoriti na tveganja, ki jih tako obdelana pitna voda lahko predstavlja za uporabnike. Ocena tveganja kemikalij za zdravje (*ang. Risk Assessment*) je uveljavljeno orodje, s katerim ob upoštevanju izpostavljenosti opazovani kemikaliji in njene toksičnosti lahko tveganje za zdravje opredelimo in ga nemalokrat tudi kvantificiramo. Pri oceni tveganja za zdravje v primeru izpostavljenosti kemično obdelani pitni vodi s polifosfati smo poleg standardiziranega pristopa ocene tveganja upoštevali tudi morebitne posredne učinke uporabljene kemikalije. Ugotavljamo, da je uporaba fosfatov za mehčanje pitne vode pogosta, pri čemer v večini primerov uporabniki tega ne vedo. Vnos fosforja preko kemično mehčane pitne vode je sicer zanemarljiv, a je kumulativni dnevni vnos preko vseh virov, tudi zaradi t.i. skritega fosforja, (pre)velik in znatno presega priporočene vrednosti, iz česar izhaja tudi vpliv na zdravje. Znatno tveganje za uporabnika lahko predstavljajo tudi posredni učinki. Posledično ocenjujemo, da tveganje za zdravje v primeru uporabe kemičnega mehčanja pitne vode ni zanemarljivo.

Abstract

Drinking water in Slovenia is often chemically softened with the use of phosphates, added to water in the household water supply network. The reason for the use of chemical softening is to prevent the scale load on water heaters, pipes and other devices and thus reducing maintenance costs. However, the health risk is not taken into account or is completely ignored. Additionally, use of chemical softeners in drinking water is not controlled and monitored by health inspection; the chemicals used are not part of the drinking water quality control, their concentrations in the water are not measured and are not included in laboratory tests. Consequently, there are no relevant data available regarding chemical softening of drinking water in Slovenia. The health risks arising from chemical water softening of drinking water have not yet been studied and defined. The purpose of the paper is to draw attention to the risks that the so-processed drinking water can pose to users.

The Risk Assessment approach is a well-established tool that can identify and quantify the health risk. In assessing the health risk of chemically treated drinking water with polyphosphates, in addition to the standardized risk assessment approach, we considered also the possible indirect harmful effects of the chemicals used. Research reveals that the use of phosphates for drinking water softening is rather common practise among caretakers in large residential buildings. In most cases users do not know that their water was chemically softened. The daily intake of phosphorus through chemically softened drinking water is minor if compared to total phosphorus intake via all sources, however also pose some health risk. Consequently, we estimate that the health risk in the case of the use of chemical softening of drinking water is not negligible.

Key words

risk assessment, chemical softening, phosphates, drinking water

ČIŠČENJE ODPADNIH VOD Z RASTLINSKIMI ČISTILNIMI NAPRAVAMI

WASTEWATER TREATMENT WITH TREATMENT WETLANDS

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Ključne besede

obdelava odpadnih vod, rastlinske čistilne naprave

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Povzetek

V srednji in vzhodni Evropi bodo številna manjša naselja in stanovanjski objekti na območju razpršene poselitve, ki trenutno nimajo ustreznega odvajanja in čiščenja odpadne vode, opremljena z greznicami ali malimi komunalnimi čistilnimi napravami. Med tehnologijami za obdelavo odpadne vode, ki so na voljo, se pogosto uporabljajo tudi rastlinske čistilne naprave (RČN). Danes je v Sloveniji v uporabi približno 150-200 sistemov, večinoma s horizontalnim pod-površinskim tokom (HF); vendar pa so se v zadnjih nekaj letih začeli graditi večinoma RČN z vertikalnim tokom (VF), ki imajo prednosti zaradi visoke učinkovitosti odstranjevanja organskih snovi in manjše potrebne površine v primerjavi s HF.

V zadnjem času je bilo vgrajenih 60 VF TW s kapaciteto čiščenja med 3 in 30 PE z neto površino 1,5 m2/PE. Tipične značilnosti VF upoštevajo danske smernice s tem, da so zaradi blažje zakonodaje manjše. Funkcija RČN predvideva čiščenje gospodinjskih odpadnih voda in vključujejo predčiščenje (tri-prekatni usedalnik), enoto za intervalno dovajanje vode (črpalni jašek ali sifon), ki na RČN dovaja med 8 in 12 pulzov in en meter globoko gredo RČN, kjer je nameščen substrat ter dotočne in iztočne razvodne cevi. RČN so zasajene z navadnim trstom (*Phragmites australis*) ali navadno peruniko (*Iris pseudocorus*).

Od leta 2013 se delovanje sistemov VF spremlja s pomočjo hidravličnih obremenitev, hidravličnega zadrževalnega časa in vrednotenja fizikalnih in kemičnih parametrov na dotoku in iztoku. Povprečni rezultati kažejo koncentracijo odvajanja (AVG ± SD mg / l) 35,7 ± 19,2 za kemijsko potrebo po kisiku (KPK) (n = 64), 7,6 ± 5,6 za biokemijsko potrebo po kisiku (BPK_5) (n = 33), 16,7 ± 3,9 za celotne usedljive snovi (TSS) (n = 4), 76,8 ± 26,6 za celotni dušik (TN) (n = 4) in 9,6 ± 0,5 za celotni fosfor (TP) (n = 4). V primerjavi z rezultati RČN v obratovanju na Danskem kažejo, da sta površina in globina iz danskih smernic potrebne za odstranitev KPK in BPK, ki

jih zahteva slovenska zakonodaja, posodobljena leta 2015 (površina 3,2 m2 / PE), lahko manjši.
Rastlinske čistilne naprave so primerne tudi za čiščenje odpadne vode iz industrijskih objektov in večjih naselij. V zadnjem času se kaže prednost pri postavljanju RČN za čiščenje komunalne odpadne vode s sistemom RČN, kjer se na površini mineralizira mulj, kar je iz ekonomskega in okoljskega vidika velika prednost pred vsemi ostalimi tehnologijami.

Abstract

In Central and Eastern Europe (CEE) numerous small settlements that currently lack proper sanitation are going to be equipped with wastewater collection systems and treatment plants. Among the available waste water treatment technologies, treatment wetlands (TW) are often used. Today, approximately 150-200 systems are used in Slovenia, mostly with horizontal sub-surface flow (HF), but in the last few years, vertical flow VFs systems have started to build mostly, due to the high efficiency of removing organic matter and require smaller area compared to HF.
Recently 60 single stage VF TW were installed with serving from 3 to 15 PE and a footprint of 1.5 m2 / PE. The design of typical VF TW in Slovenia considers the Danish guidelines. They are constructed for treating domestic wastewater and include a pretreatment, a pumping station or syphon that feeds the bed sequentially at rates varying from 8 to 12 pulses/d, and a one meter deep sand filled bed with the necessary feeding and drainage pipes. The bed is planted with common reed (*Phragmites australis)* and iris (*Iris pseudocorus*). Since 2013 performance of VF systems are being monitored by means of hydraulic loads, hydraulic retention time, and evaluation of physical and chemical parameters at inlet and outlet following Standard methods. The average results show effluent concentration of (AVG±SD mg/l) 35.7 ± 19.2 for COD (n=64), 7.6 ± 5.6 for BOD5 (n=33), 16.7±3.9 for TSS (n=4), 76.8 ± 26.6 for TN (n=4) and 9.6 ±0.5 for TP (n=4). The results of the performance efficiency and loading rates will be evaluated and compared with comparable TW, constructed in Denmark. Compared with the results of the VF TW in Denmark suggest that both the area and depth stated by the Danish national guidelines (3,2 m2/PE and 1 m deep) might be larger than the actual surface and depth needed to meet the removal of COD and BOD required by the Slovenian legislation updated in 2015.
TWs are also suitable for treating industrial wastewater and larger settlements. Recently, priority has been given to the installation of TWs for municipal waste water treatment with so called French system, where sludge is treated and mineralized on the beds of TW. This systems shows great advantage over all other technologies from an economic and environmental point of view.

Key words

wastewater treatment, treatment wetlands

UPRAVLJANJE ODPADNIH VODA DANES ZA ČISTEJŠE VODE JUTRI

WASTEWATER MANAGEMENT TODAY FOR CLEANER WATERS TOMORROW

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Ključne besede

odpadne vode, čistilne naprave, učinkovitost obratovanja, terciarno čiščenje

Povzetek

Učinkovitost delovanja čistilne naprave je odvisna od različnih dejavnikov, kot so sestava in nihanje obremenitve odpadne vode (masne in hidravlične), dejavniki okolja, onesnaževalcev, lastnosti infrastrukture, zakonskih zahtev za kakovost očiščene vode, itd. Komunalna čistilna naprava Brestanica (v nadaljevanju KČN) je bila zgrajena leta 2005, projektirana za 4.800 PE. Gre za klasično biološko čistilno napravo s kontinuiranim pretokom skozi napravo, aerobno stabilizacijo blata in časovno izmenjujočo nitri-denitrifikacijo. Namen raziskave je bil ugotoviti učinkovitost obratovanja KČN, ki smo jo spremljali v poletnem obdobju leta 2016 ter zimskem obdobju 2017. Na podlagi pridobljenih rezultatov iz leta 2016 in izvedenih aktivnosti za izboljšanje tehnološkega procesa čiščenja odpadnih voda smo preverili učinkovitost izvedenih ukrepov ter učinkovitost obratovanja tudi v hladnejših tednih leta. Naš cilj je bil, da z optimizacijo tehnološkega procesa čiščenja odpadne vode zagotovimo čim boljše učinke čiščenja, tako sekundarnega kot terciarnega, čeprav slednje za navedeno KČN ni predpisano z veljavno zakonodajo predmetnega področja. Cilj smo dosegli, predvsem z izboljšanjem učinkov terciarnega čiščenja. Procese smo stabilizirali hkrati pa prihranili pri porabi električne energije.

Kostak, komunalno in gradbeno podjetje d.d. / Kostak, civil and construction company, Krško, Slovenija

Abstract

Efficiency of wastewater treatment plant depends on various factors such as composition and fluctuation of waste water pollution (mass and hydraulic), environmental factors, pollutants and polluters, infrastructure characteristics, legal requirements, etc. The Brestanica municipal wastewater treatment plant (hereinafter KČN) was built in 2005 and designed for 4.800 PE (population equivalent). It is a classical biological treatment plant with continuous flow through the plant, aerobic stabilization of sludge and simultaneous nitrification and denitrification. The purpose of the research was to determine operational efficiency of the KČN, which was monitored during the summer period of 2016 and the winter period of 2017. Based on the obtained results from 2016 and the activities undertaken to improve the technological process of wastewater treatment, we checked the efficiency of the implemented measures and the efficiency of operation also in the cooler months of the year. Our goal was to optimize the technological process of wastewater treatment with the best possible cleaning effects, both secondary and tertiary, although the latter is not prescribed for the KČN by the applicable legislation. We have achieved our goal, above all, by improving the effects of tertiary cleaning. We stabilized the processes while saving on electricity consumption.

Key words

wastewater treatment, operational efficiency, tertiary cleaning

METODE INŠPEKCIJSKEGA NADZORA NA PODROČJU VARNE HRANE

FOOD SAFETY INSPECTION TECHNICS AND METHODS

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Ključne besede

inšpekcijski nadzor, metode, varna hrana

Povzetek

Inšpekcijski nadzor je najširša in celovita oblika izvrševanja upravnega nadzorstva. Narava nadzorstva je pravna, ker gre za izvrševanje zakonov, utrjevanje zakonitosti in urejanje pravnih odnosov med državo in posamezniki.

Z vstopom RS v EU je bil prenesen tudi pravni red EU. Pri inšpekcijskem nadzoru na področju varne hrane je potrebno upoštevati hierarhijo pravnega reda zaradi načela zakonitosti, ki zavezuje upravne organe, da opravljajo svoje delo v okviru in na podlagi ustave, ratificiranih in objavljenih mednarodnih pogodb, zakonov in drugih predpisov.

Inšpekcijsko nadzorstvo na področju varne hrane je na področju EU regulirano enotno. Zakonodaja EU med drugim določa tudi metode in tehnike inšpekcijskega nadzora ter nadzorne dejavnosti, vse z namenom, da se v okviru uradnega nadzora na področju varne hrane, preveri upoštevanje pravil EU. Med nadzorne metode in tehnike, skladno z Uredbo (ES) št. 882/2004 Evropskega parlamenta in Sveta o izvajanju uradnega nadzora, uvrščamo spremljanje, posebni nadzor, preverjanje, revizijo, inšpekcijski pregled ter vzorčenje in analizo, in uradni nadzor živil poleg inšpekcijskega pregleda vključuje različne dejavnosti, med njimi tudi pregled higienskih razmer pri nosilcih dejavnosti na področju živil ter oceno postopkov dobre proizvodne prakse, dobre higienske prakse in HACCP.

Vendar krovna EU zakonodaja na področju varne hrane podaja le okvirje in opredeljuje splošne pristope in načela za zagotavljanje visoke ravni varovanja življenja in zdravja ljudi v okviru prostega pretoka blaga v EU. V zvezi z zahtevami in razumevanjem EU zakonodaje na področju varne hrane se je pokazalo za potrebno zakonodajo dopolniti z napotki oziroma smernicami, ki služijo uradnim organom za razumevanje pravnih zahtev, kar je temelj zakonitega delovanja uradnih organov, nosilcem živilske dejavnosti pa za izvajanje EU zahtev v zvezi z varnostjo hrane.

Zbornica sanitarnih inženirjev Slovenije / The Slovenian Association of Public and Environmental Health Professionals, Ljubljana, Slovenija

Abstract

Inspection is the broadest and comprehensive form of enforcement of administrative supervision. The nature of supervision is legal because it is about the enforcement of laws, the consolidation of legality and the regulation of legal relations between the state and individuals.

With the accession of the Republic of Slovenia to the EU, the acquis was also transposed. In the inspection of food safety, it is necessary to take into account the hierarchy of the legal order on the principle of legality, which obliges the administrative bodies to carry out their work in the framework and based on the Constitution, ratified and published international treaties, laws and other regulations.

Inspection supervision in the field of food safety is regulated uniformly in the EU area. EU legislation also lays down methods and techniques of inspection and control activities, all with the aim of verifying compliance with EU rules in the framework of official controls in the field of safe food. Control methods and techniques, in accordance with Regulation (EC) No. Regulation (EC) No 882/2004 of the European Parliament and of the Council on official controls carried out includes monitoring, special surveillance, checking, auditing, inspection and sampling and analysis, and the official control of foodstuffs includes, in addition to the inspection, various activities, including an overview of the hygiene conditions of the operators food quality assessment and assessment of good manufacturing practices, good hygiene practices and HACCP.

However, EU umbrella legislation on food safety only provides frameworks and defines general approaches and principles to ensure a high level of protection of human life and health in the context of the free movement of goods in the EU. Regarding the requirements and understanding of the EU legislation in the field of food safety, it has turned out that the necessary legislation is supplemented with guidelines or guidelines that serve official bodies for understanding legal requirements, which is the basis of the legal functioning of official bodies, and for food business operators to implement EU requirements in related to food safety.

Key words

inspection supervision, methods, food safety

VLOGA SANITARNEGA INŽINERJA V IZREDNIH RAZMERAH

THE ROLE OF A ENVIRONMENTAL PUBLIC HEALTH PROFESSIONALS IN AN EMERGENCY SITUATION

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Ključne besede

sanitarni inženirji,
izredne razmere, poplave

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Hrvaška komora zdravstvenih delavcev – Strokovni razred za Sanitarno inženirstvo / Croatian Chamber of Health Professionals – Department for Environmental Public Health Professionals, Zagreb, Hrvatska

Povzetek

Sanitarni inženirji v multidisciplinarnih timih sodelujejo z drugimi strokovnjaki na področju zdravstvene ekologije, javnega zdravja, zdravja in varnosti pri delu ter varstva okolja, kar zadeva varovanje in ohranjanje zdravja ljudi v njihovem življenjskem in delovnem okolju preprečevanje bolezni.

Sanitarni inženirji z nizom primernih dejavnosti in ukrepov dajejo priporočila o preprečevanju onesnaževanja okolja s fizikalnim, kemičnim, biološkim in radiološkim onesnaževanjem.

Sodelujejo pri oblikovanju in dajanju priporočil o preprečevanju poškodb, zmanjševanju ali odpravi škode v okolju in obnavljanju okolja v prvotno stanje.

V izrednih razmerah v večjem obsegu, kot so npr. poplave, požari, potresi, orkanski vetri itd., sanitarni inženirji svojo vlogo najdejo, pri tem, da s svojimi znanjem in izkušnjami sodelujejo pri zagotavljanju zdravstveno ustrezne pitne vode in hrane, ustreznim ravnanjem z odpadki, odpadnimi vodami in pripravi ustreznih zavetišč.

Abstract

Environmental Public Health Professionals in multidisciplinary teams cooperate with other experts in the fields of health ecology, public health, health and safety at work and environmental protection in terms of protecting, preserving the health of people in their living and working environment and preventing illness.
EPH Professionals, with a series of appropriate activities and measures, make recommendations on prevention of environmental pollution by physical, chemical, biological and radiological pollution.
They participate in designing and giving recommendations on preventing damage, reducing or eliminating damage to the environment and restoring the environment to its original state.
In emergency situations in a larger range such as, for example, floods, fires, earthquakes, hurricane winds, etc. EPH professionals find their role in taking part with their knowledge and experience in providing healthy drinking water and food, proper waste management, wastewater treatment and the preparation of appropriate shelters.

Key words

environmental public health professionals, emergency situations, floods

SANITARC.SI – RAZVOJ PREPOZNAVNOSTI SANITARNEGA INŽENIRSTVA

SANITARC.SI – THE DEVELOPMENT OF RECOGNITION OF THE PUBLIC AND ENVIRONMENTAL HEALTH (SANITARY ENGINEERING) PROFESSION

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Ključne besede

sanitarno inženirstvo, javno zdravje, okoljsko zdravje, promocija stroke, prepoznavnost poklica, sanitarc.si, sanitarac.pro

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Povzetek

Inštitut za sanitarno inženirstvo je leta 2014 ustanovil spletno platformo Sanitarc.si, ki je družbeno, strokovno in znanstveno stičišče sanitarnih inženirjev. Njen namen je spodbujati poklicno in družbeno odgovornost posameznikov in institucij do stroke sanitarno inženirstvo. Platforma ima več področji: 1) sanitarne inženirje spodbuja k raziskovalno-razvojnemu delu ter jim omogoča objavo strokovnih in znanstvenih recenziranih prispevkov v reviji Sanitarno inženirstvo (International Journal of Sanitary Engineering Research – IJSER), ki izhaja od leta 1993; 2) sanitarnim inženirjem in širši javnosti z bazo *Historia Sanitaria* ponuja pogled v razvoj stroke javnega in okoljskega zdravja; 3) študentom in diplomantom sanitarnega inženirstva ob razvoju pametnih specializacij in modelov upravljanja znanj omogoča izpopolnjevanje in seznanitev s specifičnimi znanji. Platforma Sanitarc.si temelji na spodbujanju prepoznavanja problematike z različnih vidikov: razumevanje in upoštevanje večdisciplinarnosti, empatije, prilagodljivosti spremembam in intelektualni radovednosti ter sposobnosti.

Z dejavnim vključevanjem v mednarodna združenja, kot so Mednarodno združenje za okoljsko zdravje (IFEH), Evropsko združenje za javno zdravje (EUPHA) in Konfederacija evropskih združenj izvajalcev zatiranja škodljivcev (CEPA), javno predstavljamo sanitarno inženirstvo ter širimo mrežo in ugled stroke v lokalnem, regionalnem in mednarodnem prostoru. To nam od leta 2017 omogoča tudi hčerinska spletna platforma Sanitarac.pro, ki deluje v Bosni in Hercegovini.

Z vzpostavitvijo opisanih modelov želimo sanitarne inženirje povezati v enakovredne strokovne time, zagotoviti višjo dodano vrednost znanja in mednarodno prepoznavnost koristi stroke ter vzpostaviti trajen in celosten pristop razvoja in krepitve kompetentnega in motiviranega sposobnega posameznika – sanitarnega inženirja.

Abstract

The Institute of Public and Environmental Health has designed online platform Sanitarc.si in the year 2014. The platform is socially, professionally and scientifically crossroads of public and environmental health professionals (sanitary engineers). The purpose is to encourage occupationally and socially responsibility of individuals and institutions to the sanitary engineering profession. The platform has several fields: 1) it encourages sanitary engineers to scientific-development work and enable them to publish their professional and scientific reviewed articles in a scientific journal – International Journal of Sanitary Engineering Research (IJSER). The journal comes out since 1993; 2) by online database *Historia Sanitaria* offers to sanitary engineers and general public insight into field of the public and environmental health profession; 3) for students and graduates, enables introduction and upgrading of specifics know-how by smart specialization and design management skills in the field of the public and environmental health profession development. The Sanitarc.si platform is based on the encouragement of recognition issues from various aspects: understanding and taking into account multidisciplinarity, empathy, adaptability for changes, and intellectual curiosity and abilities.

By active collaboration in international associations, such as the International Association of Environmental Health (IFEH), the European Public Health Association (EUPHA), and the Confederation of European Pest Management Associations (CEPA), we are publicly presenting sanitary engineering and expanding network and reputation of profession in local, regional and international area. Since 2017 this has enabled also our subsidiary platform – Sanitarac.pro, which operates in Bosnia and Herzegovina.

With the implemented models, we want to integrate sanitary engineers into equivalent professional teams, provide a higher added value of knowledge, increase the visibility of the profile in the immediate and global environment, and establish a permanent and comprehensive approach to the development and strengthening of a competent and motivated capable individual – a sanitary engineer.

Key words

sanitary engineering, public health, environmental health, promotion of the profession, recognation of the occupation, sanitarc.si, sanitarac.pro

HISTORIA SANITARIA – RAZVOJ JAVNEGA IN OKOLJSKEGA ZDRAVJA SKOZI PRIZMO SANITARNEGA INŽENIRSTVA

HISTORIA SANITARIA – PUBLIC AND ENVIRONMENTAL HEALTH DEVELOPMENT THROUGH THE PRISM OF SANITARY ENGINEERING

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Ključne besede

Historia sanitaria, sanitarno inženirstvo, javno zdravje, okoljsko zdravje, zgodovina stroke

Povzetek

Historia Sanitaria je kronološko urejena baza zgodovinsko prelomnih dogodkov in dosežkov posameznikov na širšem področju javnega in okoljskega zdravja z vidika sanitarnega inženirstva. Vsebuje aktivno obliko prispevkov, ki jih je mogoče ves čas posodabljati oz. dopolnjevati. Namen baze *Historia Sanitaria* je domači in tuji strokovni javnosti predstaviti obširen in sistematično urejen pregled zgodovinskih dejstev, pomembnih za razvoj sanitarnega inženirstva, obenem pa izkazati spoštovanje in priznanje posameznikom, katerih strokovno delo je pomembno vplivalo na razvoj in ugled omenjene stroke. Ob poznavanju razvoja le-te lahko posamezniki in skupnost bolje razumejo sodobno strokovno problematiko in jo tudi ustrezno rešujejo, kar omogoča razvoj sinergisjkih učinkov. *Historia Sanitaria* je dostopna v elektronski in tiskani obliki. Le-ta je bila izdana leta 2018 pri založbi Inštituta za sanitarno inženirstvo, javnosti pa prvič predstavljena 17. oktobra 2018 v Mestnem muzeju Ljubljana.

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Abstract

The Historia Sanitaria is chronologically arrange base of landmark events and achievements of individuals through a wide area of public and environmental health profession (sanitary engineering). Namely, this is the living form of the contributions which are continuously updated and upgraded. The aim is to introduce to the local and foreign public a comprehensive and systematic overview of historical facts, essential for the public health professionals (sanitary engineers) development. At the same time, with contributions in the collection of *Historia Sanitaria*, we also pay our respect and honor to the colleagues whose exceptional work significantly influenced the development and reputation of the sanitary engineering profession. Knowing the development of the profession is enabling individuals and the community to understand modern professional issues better and help them to solve it appropriately, what also makes them possible to develop synergistic effects. *The Historia Sanitaria* is available in the digital and in the printing form. The first edition of the book was published in the year 2018 by publisher Institute of Public and Environmental Health (Inštitut za sanitarno inženirstvo), and was first presented to the public on 17th October 2018 in the City Museum of Ljubljana.

Key words

sanitary engineering, public health, environmental health, history of the profession, promotion of the profession, *Historia Sanitaria*