ZAŠTO?!

Katedra za higijenu i tehnologiju namirnica animalnog porekla, FVM Univerziteta u Beogradu
Risk factors for human disease emergence

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A comprehensive literature review identifies 1415 species of infectious organism known to be pathogenic to humans, including 217 viruses and prions, 538 bacteria and rickettsia, 307 fungi, 66 protozoa and 287 helminths. Out of these, 868 (61%) are zoonotic, that is, they can be transmitted between humans and animals, and 175 pathogenic species are associated with diseases considered to be ‘emerging’. We test the hypothesis that zoonotic pathogens are more likely to be associated with emerging diseases than non-emerging ones. Out of the emerging pathogens, 132 (75%) are zoonotic, and overall, zoonotic pathogens are twice as likely to be associated with emerging diseases than non-zoonotic pathogens. However, the result varies among taxa, with protozoa and viruses particularly likely to emerge, and helminths particularly unlikely to do so, irrespective of their zoonotic status. No association between transmission route and emergence was found. This study represents the first quantitative analysis identifying risk factors for human disease emergence.

Keywords: emerging diseases; zoonoses; epidemiology; public health; risk factors
An emerging disease is defined as a new infection resulting from the evolution or change of an existing pathogen or parasite resulting in a change of host range, vector, pathogenicity or strain; or the occurrence of a previously unrecognised infection or disease. A re-emerging disease is considered an already known disease that either shifts its geographical setting or expands its host range, or significantly increases its prevalence.
Fig. 8.17.1 Selected emerging and re-emerging infectious diseases, 1996–2012.

Chapter: Emerging and re-emerging infections
Author(s): David L. Heymann and Vernon J. M. Lee
From: Oxford Textbook of Global Public Health (6 ed.)

ANTIBIOTIC RESISTANCE
from the farm to the table

RESISTANCE Animals can carry harmful **bacteria** in their intestines

- When **antibiotics** are given to animals...
- Antibiotics kill most bacteria
- But resistant bacteria can survive and multiply

SPREAD Resistant bacteria can spread to...

- Animal products
- Produce through contaminated water or soil
- Prepared food through contaminated surfaces
- The environment when animals poop

EXPOSURE People can get sick with resistant infections from...

- Contaminated food
- Contaminated environment

IMPACT Some resistant infections cause...

- Mild illness
- Severe illness and may lead to death

About **1 in 5** resistant infections are caused by germs from food and animals.

Source: Antibiotic Resistant Threats in the United States, 2013

Learn 4 steps to prevent food poisoning at www.foodsafety.gov

Learn more about antibiotic resistance and food safety at www.cdc.gov/foodsafety/antibiotic-resistance.html

Learn more about protecting you and your family from resistant infections at www.cdc.gov/drugresistance/protecting_yourself_family.html
ONE WORLD – ONE HEALTH – ONE MEDICINE

- ONE HEALTH – zdravlje ljudi povezano sa zdravljem životinja i ekosistema

- CILJ – ohrabriti i promovisati zajednički multidisciplinarni pristup na lokalnom, nacionalnom i globalnom nivou
One Health - global health, veterinary public health, ecosystem health, food safety, emerging diseases, environmental degradation (because of chemical and microbial contamination), animal models of human diseases, and wildlife medicine and management among other things. Essentially, through veterinary medicine, One Health bridges animal, human, and environmental/ecosystem health in ways that no other profession does.
One Health Initiative will unite human and veterinary medicine

The One Health Initiative is a movement to forge co-equal, all inclusive collaborations between physicians, osteopathic physicians, veterinarians, dentists, nurses and other scientific-health and environmentally related disciplines, including the American Medical Association, American Veterinary Medical Association, American Academy of Pediatrics, American Nurses Association, American Association of Public Health Physicians, the American Society of Tropical Medicine and Hygiene, the Centers for Disease Control and Prevention (CDC), the United States Department of Agriculture (USDA), and the U.S. National Environmental Health Association (NEHA). Additionally, more than 900 prominent scientists, physicians and veterinarians worldwide have endorsed the initiative.

Please see MONOGRAPH in Veterinaria Italiana "One Health - One Medicine": linking human, animal and environmental health

HISTORY of the One Health Initiative team (April 2006 through September 2015) and the One Health Initiative website since October 1, 2008

Latest News  Upcoming Events  Recent Publications  ProMED-mail
"ONE HEALTH" KONCEPT

- Prva dekada novog milenijuma - pandemija akutnog respiratornog sindroma i avijarine influence (H5N1)

- Međupovezanost ljudi i etioloških izvora pandemija u animalnim rezervoarima
HISTORIJA “ONE HEALTH” KONCEPTA

- Komparativna medicina - ideja da ne postoji linija između ljudi i životinja kada se radi o zdravlju i bolesti
- Prva veterinarska škola u Lionu, Francuska 1761. - Claude Bourgelat, naglašava značaj komparativne biopatologije
- XX stoleće - Karl Meyer, Calvin Schwabe i James Steele, održavaju transdisciplinarni pristup kroz njihov rad na javnom zdravlju i zoonozama
- Schwabe i Steele koriste termin - „One World, One Medicine, One Health”
HISTORIJA “ONE HEALTH” KONCEPTA

- 1999. serija tematskih konferencija - Society for Tropical Veterinary Disease i Wildlife Diseases Association – “WORKING TOGETHER TO PROMOTE GLOBAL HEALTH”

- Druga konferencija – Pilanesberg, Južna Afrika – pitanje interfejsa domaće životinje/divlji život u odnosu na kontrolu tzv. “emerging” bolesti, održivu proizvodnju hrane i konzervisanje biodiverziteta

- “Pilanesberg Resolution” – kamen temeljac ranog razvoja koncepta “One Health”
In 2005, The Veterinary Record and BMJ published an influential joint issue on the theme of ‘one medicine’.
HISTORIJA “ONE HEALTH” KONCEPTA


- ROGER MAHR – predsednik American VETERINARY MEDICAL ASSOCIATION (AVMA) – 2006. ONE HEALTH INITIATIVE TASK FORCE

- 2007. AMERICAN MEDICAL ASSOCIATION – jednoglasno odabrava inicijativu

- ONE HEALTH – ulazi u medicinske i naučne leksikone

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>2004</td>
<td>The Wildlife Conservation Society publishes the 12 Manhattan Principles</td>
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<tr>
<td>2007</td>
<td>The American Medical Association passes the One Health resolution promoting partnership between human and veterinary medicine</td>
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<td>2007</td>
<td>The One Health approach is recommended for pandemic preparedness</td>
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<td>2008</td>
<td>FAO, OIE, and WHO collaborate with UNICEF, UNSIC, and the World Bank to develop a joint strategic framework in response to the evolving risk of emerging and re-emerging infectious diseases</td>
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<td>2008</td>
<td>One Health becomes a recommended approach and a political reality</td>
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<tr>
<td>2009</td>
<td>The One Health Office is established at CDC</td>
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<tr>
<td>2009</td>
<td>USAID establishes the Emerging Pandemic Threats program</td>
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<tr>
<td>2009</td>
<td>Key recommendations for One World, One Health™ are developed</td>
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<tr>
<td>2010</td>
<td>The Hanoi Declaration, which recommends broad implementation of One Health, is adopted unanimously</td>
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<td>2010</td>
<td>The Tripartite Concept Note is published</td>
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<td>2010</td>
<td>Experts identify clear and concrete actions to move the concept of One Health from vision to implementation</td>
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<td>2010</td>
<td>The United Nations and the World Bank recommend adoption of One Health approaches</td>
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<td>2010</td>
<td>The European Union reaffirms its commitment to operate under a One Health umbrella</td>
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<td>2011</td>
<td>The 1st International One Health Congress is held in Melbourne, Australia</td>
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<td>2011</td>
<td>The 1st One Health Conference in Africa is held</td>
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<td>2011</td>
<td>The High Level Technical Meeting to Address Health Risks at the Human-Animal-Ecosystem Interface builds political will for the One Health movement</td>
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<td>2012</td>
<td>The Global Risk Forum sponsors the first One Health Summit</td>
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<tr>
<td>2013</td>
<td>The 2nd International One Health Congress is held in conjunction with the Prince Mahidol Award Conference</td>
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E. Paul J. Gibbs Veterinary Record 2014;174:85-91
The One Health concept recognizes the interrelationship between animal, human and environmental health.
DEFINICIJA

- suradnja na globalnom nivou između mnogih naučnih disciplina kako bi se osiguralo zdravlje ljudi, domaćih životinja, i ekosistema (uključujući i divlji život), u industrijalizovanom i svetu u razvoju.

- One Health Initiative - American Veterinary Medical Associations (AVMA) - „zajednički trud mnogih disciplina radeći lokalno, nacionalno i globalno kako bi postigli optimalno zdravlje za ljude, životinje i okoliš.

- EU - “poboljšanje zdravlja i dobrobiti kroz (i) prevenciju rizika i smanjenje efekta kriza koje se pojavljuju na liniji interfejsa između ljudi, životinja i njihovih različitih staništa i (II) promovisanje međusektorskog, saradničkog, tzv. „kompletno društvo“ pristupa hazardima zdravlja
Definitions of One Health

‘One Health is the collaborative effort of multiple health science professions, together with their related disciplines and institutions – working locally, nationally, and globally – to attain optimal health for people, domestic animals, wildlife, plants, and our environment.’

One Health Commission

‘A collaborative, international, cross-sectoral, multidisciplinary mechanism to address threats and reduce risks of detrimental infectious diseases at the animal-human-ecosystem interface.’

Food and Agriculture Organization

The World Organisation for Animal Health, while not specifically defining One Health, endorses the approach as ‘a collaborative and all-encompassing way to address, when relevant, animal and public health globally. This collaboration should not be limited to only the international level, but must be translated as a new and fundamental paradigm at national levels’.

The One Health Global Network considers that the aim of One Health is to ‘improve health and wellbeing through the prevention of risks and the mitigation of effects of crises that originate at the interface between humans, animals and their various environments’.

The One Health Committee of the World Small Animal Veterinary Association comments that ‘One Health or One Medicine proposes the unification of the medical and veterinary professions with the establishment of collaborative ventures in clinical care, surveillance and control of cross-species disease, education, and research into disease pathogenesis, diagnosis, therapy and vaccination. The concept encompasses the human population, domestic animals and wildlife and the impact that environmental changes (‘environmental health’) such as global warming will have on these populations.’

The One Health Initiative considers One Health to be ‘a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals, and the environment’.
FIG 2: Scope of One Health according to the One Health Initiative (www.onehealthinitiative.com)
Zakletva koju studenti veterine u SAD daju pri diplomiranju, veoma dobro ilustrira vernost zakonitostima „One Health“ koncepta:

„Posvećen profesiji veterinarske medicine, svečano se zaklinjem da ću koristiti svoje znanje i veštine za dobrobit društva kroz zaštitu zdravlja i dobrobiti životinja, sprečavajući i olakšavajući patnju životinja, promovišući javno zdravlje, a unapređujući svoje znanje. Upražnjavaću svoju profesiju savesno, sa dostojanstvom, čuvajući principe veterinarske medicinske etike. Prihvatam kao doživotnu obavezu kontinuirano usavršavanje mog profesionalnog znanja i sposobnosti.“

Veterinarska zakletva, na ovaj način, reflektuje ono što društvo očekuje od veterinara.

Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health and welfare, the prevention and relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge. I will practice my profession conscientiously, with dignity, and in keeping with the principles of veterinary medical ethics. I accept as a lifelong obligation the continual improvement of my professional knowledge and competence.

(AVMA 2012b)
Graduates from the University of Florida highlight the subject of their masters degree at their graduation ceremony in December 2013.
HISTORIJSKA ULOGA VETERINARSKE PROFESIJE U „ONE HEALTH“ KONCEPTU I PROFIL PROFESIJE DANAS

- Osnivanje prve veterinarske škole u Lionu, 1761. - primarno uspostavljena kao želja da se odgovori na epidemiju goveđe kuge, koja je u to vreme harala Francuskom

- Kroz devetnaesto stoleće, i početkom XX stoleća, fokus veterinarskog obrazovanja obuka veterinara u kontroli bolesti kod "food-producing" životinja, kao i prevencija transmisije zoonoza, i, značajnim delom, u kliničkoj brizi konja (jahanje, vuća, ratovanje).
Danas u USA, otprilike 77% kliničkih veterinara radi malu praksu, da li isključivo ili većim delom; oni koji rade na „food – producing animals“-velika praksa predstavljaju otprilike 8%.

Za profesiju koja je primarno osnovana u cilju zaštite zdravlja životinja u poljoprivredi, eradikaciji zoonotskih bolesti i osiguranju brige konja, ova promena – usmeravanje na malu praksu – u industrijalizovanim državama je bila dramatična.
Fig. 2  a  Veterinary professional functions by type of species.  b  Veterinary professional functions by type of employment
<table>
<thead>
<tr>
<th>Human health</th>
<th>Domestic animal health</th>
<th>Ecological health</th>
</tr>
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<tbody>
<tr>
<td>Reduce global hunger</td>
<td>Promote animal welfare</td>
<td>Protect biodiversity</td>
</tr>
<tr>
<td>Control zoonoses</td>
<td>Prevent disease outbreaks</td>
<td>Management of wildlife resources</td>
</tr>
<tr>
<td>Monitor food quality and safety</td>
<td>Increase domestic animal production for food</td>
<td>Control movement of exotic species and diseases</td>
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<tr>
<td>Biomedical research</td>
<td>Increase and support animal product exports</td>
<td>Disease prevention in wild animal populations</td>
</tr>
<tr>
<td>Disease surveillance</td>
<td>Disease surveillance, diagnosis, and control</td>
<td>Disease surveillance</td>
</tr>
<tr>
<td>Biosecurity</td>
<td>Provide clinical and population health expertise for all animals</td>
<td>Conservation of natural resources, conservation medicine</td>
</tr>
<tr>
<td>Human–animal bond:</td>
<td>Combatting antimicrobial resistance</td>
<td>Climate change adaptation activities</td>
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<tr>
<td>maintaining companion animal health</td>
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Edukacija veterinara u “One Health”

- Profesija mora delovati daleko više proaktivno, i pripremiti se za budućnost prepoznajući promenu u potrebama društva,

- Značajna uloga veterinara u 5 preklapajućih domena rada: javno zdravlje, biomedicinska istraživanja, globalna bezbednost hrane, zdravlje ekosistema, i daleko tradicionalnija uloga u brizi za životinje (King, 2009).

- “Core subjects” – javno zdravlje, bezbednost hrane, epidemiologija, populaciona medicina, bolesti divljih životinja

Potreba reorganizacije i izmene kurikuluma – Ahilova peta profesije je prepoznata i renesansno doba zvano “One Health” koncept daje mogućnost buđenja profesije.
Noah's Ark on Mount Ararat by Simon de Myle
U alegoriji “lifeboat” testa, da li naše društvo, u stvarnosti, ide ka santi leda? Pažljiv i misaoni pogled na svet danas ukazuje - udarićemo u santu leda. Ta santa leda jeste do danas, bez presedana, globalni zamajac u broju i aktivnosti ljudi. (Slike 1-3).

**Figure 1.** World population growth from 1 AD to 2000 AD, projected to an estimated of 11 billion people in 2050. Redrawn and projected from Cohen 1995 (2).

**Figure 2.** World energy use, from 1800 to 1990 AD, expressed as total energy equivalents in millions of metric tons of petroleum are from McNeill 2000 (3).

**Figure 3.** World economic activity from 1500 to 1992 AD, expressed as a percent of global gross domestic product (GDP) in the year 1500. Data are from McNeill 2000 (3).
CENTRALNO PITANJE: DA LI VETERINARSKA MEDICINA MOŽE BITI RELEVANTNA, ZNAČAJNA ZA DRUŠTVO, I TO NA NAČIN NA KOJI SE STVARNO RAČUNA? NE ZABORAVIMO, ZDRAVLJE ŽIVOTINJA JE ONO ŠTO U SUŠTINI, U SVOJOJ OSNOVI, PRESTAVLJA DOMINANTNO DRUŠTVENO PITANJE 21. VEKA: BIOLOŠKA SIGURNOST
Ovako postavljen kurikulum pada na “lifeboat” testu društvene relevantnosti. Revidirani kurikulum mora obezbediti studentima osnovno znanje iz biologije životinja i bolesti, komparativne medicine i kliničkih predmeta. Pored ovoga, što predstavlja jezgro, mora postojati veliki broj opcija, kombinacije kurseva i orijentacija, kroz koje studenti mogu završiti svoje obrazovanje, uključujući, ali i ne ograničavajući se isključivo na epidemiologiju, laboratorijsku medicinu, zakonsku medicinu, javno zdravlje, bezbednost hrane, na jednakim nogama sa kliničkom praksom. Analiza rizika, nadzor bolesti, geografski informacioni sistemi, okolišni i ekološki aspekti zdravlja, bezbednost i proizvodnja hrane, zoonoze, iskustvo u istraživanju moraju imati podjednako mesto kao i klinička praksa.

Veterinarska profesija ima kolektivni kapacitet da učine sve ovo, i mora to učiniti. Ukoliko ne učini, potonuće, i to u ne tako dalekoj budućnosti, zajedno sa brodom.
MSc Veterinary Epidemiology

This is a joint programme provided by the School and the Royal Veterinary College (RVC). There is a shortage of trained veterinary epidemiologists and there are excellent career opportunities for graduates. This course provides training in essential methodological skills for the design, conduct, analysis, interpretation and communication of epidemiological studies; and surveillance and disease control in animal and human populations.

This programme is also available as a Postgraduate Diploma.

Graduates from this programme hold positions in a variety of organisations including: Ministries of Agriculture & Food; Veterinary Investigation Laboratories; Animal Disease Research Institutes; Animal Health Trusts; Veterinary Faculties in Universities and International Organisations concerned with global health (DFID, FAO, WHO, OIE, etc). Find out more about our graduate careers and destinations.

Duration: one year full-time or split-study over two years. Modes of study explained.

- Full programme specification (pdf)
- Intercalating this course

Admission status
- Open for 2017/18

Programme Directors
- Ellen Fragaszy (LSHTM)
- Julian Drew (RVC)

Contact a Student
17. Educational aims of programme

Consistent with the Framework for Higher Education Qualifications (http://www.qaa.ac.uk/Publications/InformationandGuidance/Documents/FHEQ08.pdf) at Masters level (level 7), this course will provide students with an understanding of the conceptual basis of epidemiology and with training in essential methodological skills for the design, conduct, analysis, interpretation and communication of epidemiological studies, surveillance and disease control in animal and human populations.

On completion of the MSc and PG Diploma course, students will be able to:

- demonstrate a profound understanding of epidemiology as the study of patterns and factors that affect health and welfare in animal and human populations;
- recognise the importance of related disciplines and methods such as economics and mathematical modelling and how they contribute to epidemiology, with the opportunity to learn and apply these;
- demonstrate advanced knowledge and understanding of the role of epidemiology, the major health issues in both human and animal populations and the contribution of epidemiology to other health related disciplines;
- select an appropriate study design when confronted with an epidemiological research question and develop a study protocol capable of answering the research question;
- enter and manage computerised epidemiological data and carry out appropriate statistical analyses;
- assess the results of epidemiological studies (their own or other investigators’), including critical appraisal of study question, study design, methods and conduct, statistical analysis and interpretation;
- apply epidemiological principles to surveillance and infection and disease control within animal and human populations;
- communicate effectively with researchers from different disciplinary backgrounds, and with people who have an interest in human and animal health, including the general public and key policy makers;
- demonstrate advanced integration and problem solving skills;
- continue to develop independent and lifelong learning skills to promote their own personal and professional development as veterinary epidemiologists and leaders.
How much do you know about food safety?

1 - Foodborne diseases can cause death.
   - True
   - False

2 - If food looks OK and smells OK it is always safe to eat.
   - True
   - False

3 - Some microorganisms are useful to make food and drinks.
   - True
   - False

4 - The proper temperature for a home refrigerator should be
   - Below 8°C (46°F)
   - Below 5°C (41°F)

5 - Keeping raw and cooked food separate prevents cross-contamination.
   - True
   - False
Tell us what you think!