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**Review article**

**IMPORTANCE OF COLLABORATION BETWEEN PHYSICIANS AND VETERINARIANS IN ONE HEALTH CONCEPT**

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**Summary**

Human medicine and veterinary medicine are two areas within medical sciences and there are great opportunities and needs to connect them more closely, especially in the treatment of humans and animals. One health promotes cooperation and connection between physicians and veterinarians, but also environmental experts and other professionals who are important for health. Some experts believe that the progress of this cooperation would be achieved by the education of patients and animal owners about zoonotic diseases of their pets, which should be carried out by physicians and veterinarians. One health has the task of helping the physicians to recognize that a certain disease is not exclusively related to human medicine, but to point out that veterinarians also encounter this disease. Better and closer cooperation between physicians and veterinarians would contribute to both professions to better recognize and treat certain human and animal diseases and prevent and reduce the negative impact of the environment on human and animal health. By introducing the concept of One Health, there are opportunities for better cooperation and mutual work, but at the moment there is still a distance between these two professions. A large number of experts deal with this problem all over the world, and it is considered that a strategy should be made which would eliminate this problem and also contribute to the promotion of the One Health concept. The importance of cooperation between physicians and veterinarians is great, and, nowadays, the contribution of new scientific

knowledge on the examples of different species represents a great challenge for science.

**Keywords:** One health, collaboration, physicians, veterinarians, environment

## INTRODUCTION

The One Health concept includes the health of people and animals as well as the environment that surrounds them. The origin of one medicine and the concept of One Health, the collaboration of physicians and veterinarians, is associated with the German doctor and pathologist Rudolph Virchow, back in the 19<sup>th</sup> century, who discovered the life cycle of trichinella (*Trichinella spiralis*), which enters the human organism after pork meat consumption. He introduced the term zoonosis and pointed out the similarities between humane and veterinary medicine, and stated that there should not be a division between physicians and veterinarians. Back then, there were some conversations related to collaboration between physicians and veterinarians in the treatment of humans and animals (Saunders, 2000; Kahn et al., 2007; Gyles, 2016; Jeftić et al., 2021; Belić et al., 2021).

The thought expressed by Hippocrates (460-367 BC), that when observing people's way of life they should not be observed outside their environment, clearly indicates that even then there was a significant influence of the environment on people's lives. In the old century, Hippocrates and Galen put forward the theory that all organisms are made of four types of fluids, and that an individual's illness is a consequence of the imbalance that occurs between these fluids. In this period, both humans and animals participated in the tests, and they had the same treatment and attention. This theory was valid until the discovery of microbes and modern understandings of the humoral and cellular immune response. In the 18<sup>th</sup> century, Pope Clement XI gave the physician, Giovanni Maria Lancisi (1654-1720), instructions for the fight and measures directed against plague of ruminants, because it was known that is lethal viral disease of animals which significantly affects yields and reduces food supplies. He suggested culling of animals as a method for preventing the spread of the disease. The first veterinary school in Lyon was founded in 1761 to prevent the spread of this dangerous infectious disease. Students in the field of animal health were taught by Claude Bourgelat (1712-1779), and he used the same "pathobiological principles" that were applied in human medicine and dealt with their impact on animal health. After the establishment of the first veterinary school in Lyon, the importance and role of veterinarians increased significantly in society. After the establishment of this school, similar schools were founded in Europe and throughout the world.

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The concept of One Health continued to be mentioned in the following years until today. William Osler, a Canadian physician and pathologist, who taught medical students at McGill College and veterinary students at the Montreal Veterinary College during the 1870s, established the concept of comparative pathology of animals and humans in the One Health concept, and introduced a unique concept of medicine (Kahn et al., 2007; Kahn, 2008; Schultz, 2008). At the end of the 19<sup>th</sup> century, in their research, Grant and Olsen studied the role of physicians and veterinarians in the prevention of zoonotic diseases in immunocompromised patients and found out that physicians did not talk enough with their patients about these diseases, but also that patients did not recognize veterinarians as experts to treat their illness. They found that the risk of chronically immunocompromised patients who own animals is significantly higher than in immunocompetent individuals. Significant progress could be achieved if physicians and veterinarians would educate their patients or clients about zoonotic diseases of their pets. They believed that medical and veterinary schools should provide their students with knowledge about the way animals and humans influence each other. It is believed that the One Medicine approach was advanced by public health veterinarians, the most prominent of whom was James Harlan Steele (1913-2013), who is today considered to be the father of veterinary public health. In 1947, he founded the Department of Veterinary Public Health at the Center for Infectious Diseases in the USA (History of one health). This organization was concentrated on zoonotic diseases: bovine tuberculosis, brucellosis, rabies and salmonellosis, and applied public health principles to their prevention and eradication. One of the creators of one medicine or the concept of One Health is Calvin Schwabe, who insisted on the cooperation of professionals in human and veterinary medicine in the study of zoonotic diseases, and promoted the prevention in general and prevention of outbreaks of these diseases. During the 19<sup>th</sup> century, cooperation between physicians and veterinarians was very limited and took place only in individual cases.

The term One Medicine has evolved into One Health, which emphasizes the promotion of health rather than the treatment of disease. In the following period of development of this concept, the influence of the environment on health i.e. the influence of factors of the environment on people and animals came up. The One Health Initiative was established in 2006. Nowadays, the concept of One Health and its interest is focused on diseases, which are the result of the interaction between humans and animals. The aim of this concept is to promote the application of an interdisciplinary, multidisciplinary approach to mitigating and reducing existing or potential health risks arising from human interactions. International multidisciplinary scientific communities, political and government

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leaders, the general public and the media are being educated about the concept of One Health, which help promote the rapid implementation of the concept around the world. The One Health Newsletter, published by the University of Florida, seeks to encourage communication and collaboration among veterinarians, physicians, public health professionals, and environmental scientists and to identify multidisciplinary solutions for these common challenges. Increased interest in One Health appears after conferences in 2011, which were held in the USA, and physicians and veterinarians, who deal with similar diseases in humans and animals, participated in them. The One Health concept has the task to help the physician to recognize that a certain disease is not exclusively related to human medicine, but that also veterinarians deal with it. Conferences and gatherings about One Health aim to move one health from the periphery of human medicine to the central position where it belongs.

Outbreaks of zoonotic diseases, such as SARS, Ebola virus infections and pandemic influenza served to highlight the importance of the One Health concept. One Health needs to be promoted more at the local level, due to the improvement of communication and cooperation between physicians and veterinarians in the exchange of information, knowledge and education about zoonoses and other public health issues. The leading place in promoting the understanding of the ecosystem in veterinary medicine was held by Canadian veterinary schools, which tried to prepare veterinarians to work as part of transdisciplinary teams dealing with the concept of One Health, i.e. the treatment of diseases (Nielsen et al., 2012; Kirovski and Plavšić, 2019). The proposal of Nielsen et al. (2014) was to strengthen the capacities of the veterinary profession at the national level and to allow them a leading role in public policy. Historically speaking, despite the advanced understandings of many scientists, there is a very long way to develop the concept of One Health and the connection and cooperation of physicians and veterinarians.

One Health is considered one of the most important health movements and concepts today. Collaboration between humane and veterinary medicine has the potential to lead to new scientific understandings, create new therapies and change the way physicians, veterinarians and their patients and clients understand health and disease. The concept of One Health has not gained sufficient importance and developed awareness or attraction in humane medical communities. Since its inception, this concept, which was initially called One Medicine, has primarily been guided by the world's veterinary professions. It has been known at medical and veterinary faculties around the world for about 15 years, and comparative medicine has been present on university campuses with veterinary and medical schools for decades longer (Wilkinson, 1992). Although several physicians played

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a leading role in the concept of One Health, in the United States, despite more than fifteen years of strong growth of the movement, many still have not heard of it. In the world, a large number of physicians are involved in this movement, but it has not yet been given sufficient importance and a sufficient connection between physicians and veterinarians i.e. human and veterinary medicine has not been achieved. In the One Health concept, there are mostly people who work on zoonoses in the field of food safety and infectious diseases. It is known that zoonoses are diseases characteristic for humans and animals, which are transmitted between animals, or from animals to humans. Transmission can be direct or indirect, through a vector or through a contaminated environment (Saunders, 1987).

In order to understand the connection between animals, people and their health, physicians, who are not only infectious disease specialists, should be included in the One Health concept. One of the main challenges of the One Health concept is involving physicians to understand that it is necessary for their daily work. The medical community, to which physicians and health personnel belong, is still largely excluded from the concept of One Health, but without the significant involvement of physicians, nurses and other health workers, its potential cannot be fully realized.

It is necessary for physicians to recognize that the diseases they treat in their patients are often not unique only to humans, that is, that animal health experts have information and knowledge about diseases transmitted by animals, which should be shared with physicians and thereby improve the concept of One Health. There are a large number of possibilities for cooperation, but also a large gap between these two professions (Natterson-Horowitz, 2015).

The concept of One Health is not new, because it is known that the health of people, animals and the ecosystem represent a whole since the emergence of the human species. One Health does not have one concrete and universally accepted definition. The definition of the American Veterinary Medical Association is used the most: One Health is an integrative approach of several different disciplines, which are realized at the local, national and global level in order to maintain optimal health of people, animals and environment. The World Health Organization has defined One Health as an approach for designing and implementing programs, policies, legislation and research, in which multiple sectors communicate and work together to achieve better public health outcomes. One Health implies a series of procedures in everyday practice, which contribute to the health of people and animals. The One Health Department in Sweden and the One Health Initiative Autonomous *Pro Bono* Team presented One Health with a schematic representation of an "umbrella", which covers all the areas that this

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concept should deal with and clearly focuses on the consequences, reactions and actions on animals - humans - ecosystem and their connection. It focuses especially on zoonoses, both endemic and zoonotic zoonoses, where the former are responsible for a much greater burden of disease in developing countries, with a large social impact in the environment and poor resources (Welburn et al., 2015; Cleaveland et al., 2017).

In addition to human and veterinary medicine, One Health encompasses other disciplines in its concept, including ecology and ecosystem health, social sciences, land use and biodiversity. The veterinary community got involved in the One Health concept very quickly, which was not the case with the medical community. One Health is also supported by the American Medical Association, Public Health England and the World Health Organization. In addition to this support, for a more complete inclusion of the medical community in the future, it will be necessary to include the concept of One Health in the curricula of medical schools and medical study programs, so that they accept Public Health as an important component of public health and infectious diseases (Rabinowitz et al., 2017; Kirovski and Plavšić, 2019).

There is no better qualified profession than the veterinary profession, which through history and training has promoted the interdisciplinary approach of One Health and was a leader in the implementation of the first steps.

Most veterinarians today complete specializations for one type of animal or one sector of the profession, but remain faithful to their oath and perform their practice according to the principles of the One Health concept. One Health represents a systematic approach to different practices, which continues to grow and takes into account ecosystem impacts in addition to zoonoses (Battelli and Mantovani, 2011).

The monitoring of animals and their health condition is the main component of One Health, especially in the detection of new threats that may occur in relation of animals and humans.

Rolf Zinkernagel and Peter C. Doherty, a physician and a veterinarian, discovered that the immune system distinguishes between normal and virally infected cells. In 1996, they received the Nobel Prize in Medical Physiology or Medicine (Nobelpriset i fysiologi eller medicin). This example shows that the concept of One Health is very important for scientific research and practical work of physicians and veterinarians.

One Health is the concept of different disciplines gathered into one perspective, with common solutions for preserving the health of people and animals while preserving the environment, optimal health of people, animals and ecosystems, i.e. the environment (Savić et al., 2014).

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Throughout history, medical workers have treated people and animals. There is information that in the 18<sup>th</sup> century, physicians took over the care of animal health in the area of Vojvodina. They played an important role in the organization of the veterinary service, because until the second half of the 19<sup>th</sup> century, in addition to humane medicine, they also dealt with the suppression of livestock diseases and veterinary police. Physicians were able to perform this work until 1819, when a regulation was brought for the second time that only those physicians who have a veterinary exam, or who have been trained as a graduate veterinarian at the Veterinary Institute in Vienna, can perform the work of veterinarians. This type of regulation was first brought in 1781, but at that time there was not a sufficient number of physicians with a veterinary exam. At the Veterinary Institute in Vienna, two-year postgraduate studies in veterinary medicine began that year, and physicians and surgeons enrolled in them. After completing their studies, candidates received the title of veterinarian, and from 1833-1857 they received also a master's degree in veterinary medicine. It was not until 1910 in Vojvodina that the health care of domestic animals was completely taken over by academically educated veterinarians, who completed their studies at veterinary faculties or departments of medical faculties in Europe (Jovanović, 2004; Belić, 2014).

The separation of medicine into veterinary and human medicine occurred at different periods in different areas. In less developed countries, this division is not as strict as in developed societies. Today, in most countries, human and veterinary medicine are legally separate fields. In Germany, veterinarians are not allowed to treat people, except in exceptional cases. In less developed countries, this division is only partial, because their traditionalist approach to medical sciences (which values each species equally) exists despite the accepted postulates of modern medicine. In traditional systems and remote areas, local "healers" are the only ones who deal with human and animal health. In developed areas, with all the necessary equipment, medicine is divided into human and veterinary medicine. An important implication of the One Health concept and the approach that this concept has are areas of medicine that deal with drinking water, people's hygiene habits, environmental hygiene, poor and uncontrolled nutrition, as well as the close relationship between people and animals (Jevtic et al., 2020).

In 2018, over 2 million deaths were recorded as a result of zoonotic diseases, while over 2 billion were caused by a zoonotic pathogen.

In this case, veterinarians represent the "first line" for recognizing, diagnosing and responding to these diseases. Man is the host for only 3% of zoonotic pathogens. However, in order to confirm the outbreak of the disease, it is necessary to recognize cases of human illness as well as sick individuals. Effective supervision,

monitoring and disease control requires cooperation between veterinarians and physicians. The increase in the need for food raw materials and their control and quality depend on veterinarians. They are also related to the production of safe, especially microbiologically safe food, which could be a threat and transmit infectious agents to humans (FAO, 2011; Kelly et al., 2013; Nabarro, 2012). Coordination and cooperation of physicians, veterinarians, dentists and biologists leads to better prevention of certain diseases, which is more important than acting on them once they have already developed. Prevention is always a better step than treatment. The effective fight against zoonoses requires the One Health approach and concept, interdisciplinary cooperation for the prevention and control of infectious diseases and epidemics, chronic diseases that attack humans and animals. Physicians, veterinarians, ecologists, environmentalists, laboratory animal experts and other scientific fields must work together and cooperate in order to overcome professional barriers (Mersha and Tewodros, 2012).

Although veterinary medicine represents the leader of the One Health concept, there are justified fears that it will move away from it. Veterinary medicine has good foundations for the promotion, adoption and management of the One Health concept, but it is necessary to introduce professional training and education into the curricula, in order to better implement the One Health concept (Gibbs and Gibbs, 2012).

During their work, veterinarians observe animals and their owners, people, which enables them to be the first to spot diseases with zoonotic potential and to point out that a certain threat exists. They are excellent experts in comparative medicine, zoonoses and public health. Physicians do not pay enough attention and do not undergo serious education in the field of zoonoses and comparative medicine. As a result, veterinarians are in a better position to recognize a threat to public health. In underdeveloped countries and poorer areas, the introduction of the One Health concept can potentially improve effective disease control for humans and animals (Mersha and Tewodros, 2012).

Although the One Health concept is increasingly initiated, many countries of the European Union still do not show serious tendencies towards its adoption and cooperation in various fields. Many countries have introduced the One Health concept in the fight against zoonoses and antimicrobial resistance. In practice, it has been shown that veterinarians better accept and promote this concept, as well as the importance of mutual cooperation, than physicians. The promotion of this concept should help promote a multidisciplinary approach (De Guisti et al., 2019). People have forgotten the catastrophic consequences of zoonotic diseases that occurred in the past. There has been an increase in the occurrence of especially zoonotic diseases in the last few decades. It is not good to ignore the possibility of

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outbreaks of diseases, and to not systematically fight against them. Bearing in mind that zoonoses have a huge impact on public health, animals and the environment, the importance of the One Health concept should be highlighted and its systematic approach should be applied, which is very important. The interdisciplinary cooperation in the One Health concept is important in reducing threats to global health from infectious diseases.

### CONCLUSION

Better and closer cooperation between physicians and veterinarians and their connection would contribute to both professions to better recognize and treat certain human and animal diseases and to prevent and reduce the negative impact of the environment on human and animal health. By introducing the concept of One Health, there are opportunities for better cooperation and mutual work, but at the moment there is still a distance between these two professions. In the world, a large number of experts deal with this problem and it is considered that a strategy should be made which would eliminate this problem and would also contribute to the promotion of the One Health concept. The importance of cooperation between physicians and veterinarians is great, and the contribution of new scientific knowledge on the example of different species represents a great challenge for science.

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### REFERENCES

- Battelli G., Mantovani A. (2011): The veterinary profession and one medicine: some considerations with particular reference to Italy, *Vet. Ital.*, 47(4):389-95.
- Belić B. (2014): Zdravstvena kultura Sremskih Karlovaca. Društvo lekara Vojvodine. Srpsko lekarsko društvo.
- Belić B., Cincović M., Novakov N. (2021): Jedno zdravlje – veza humane i veterinarske medicine. U: Jedno zdravlje, ur. Jevtić M., Belić B., Savić S. Akademija medicinskih nauka SLD, 34-47.
- Cleaveland S., Sharp J., Abela-Ridder B., Allan K. J., Buza J., Crump J. A., Davis A., Del Rio Vilas V. J., de Glanville W. A., Kazwala R. R., Kibona T., Lankester F. J., Lugelo A., Mmbaga B. T., Rubach M. P., Swai E. S., Waldman L., Haydon D. T., Hampson K., Halliday J. E. B. (2017): One Health contributions towards more effective and equitable approaches to health in low- and middle-income countries. *Philo. Trans. R. Soc. B.*, 372:20160168.
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- De Giusti M., Barbato D., Lia L., Colamesta V., Lombardi A. M., Cacchio D., Villari P., La Torre G. (2019): Collaboration between human and veterinary medicine as a tool to solve public health problems. *Planetary health*; 3(2):e64-e65.
- FAO. (2011): One health: food and agriculture organization of the United Nations strategic action plan. Food and Agriculture Organisation.
- Gibbs S. E. J., Gibbs E. P. J. (2012): The Historical Present, and Future Role of Veterinarians in One Health. In: Current Topics in Microbiology and Immunology. Springer, 365:31-47.
- Gyles C. (2016): One Medicine, One Health, One World. *CVJ*, 57:345-346.
- Jeftić M., Belić B., Savić S. (2021): Jedno zdravlje. Akademija medicinskih nauka Srpskog lekarskog društva, 10(1).
- Jevtic M., Belic B., Glavas-Trbic D. (2020): One Health Approach in Traditional Milk Production as a Part of Steps towards SDGs. *European Journal of Sustainable Development*, 9(1):263.
- Jovanović P. V. (2004): Istorija veterinarske medicine i zdravstvena kultura na tlu današnje Vojvodine. Matica Srpska.
- Kahn L. H., Kaplan B., Monath T. P., Steele J. H. (2008): Teaching “One Medicine, One Health”. *Am J Med.*, 121(3):169-70.
- Kahn L. H., Kaplan B., Steele J. H. (2007): Confronting zoonoses through closer collaboration between medicine and veterinary medicine (as ‘one medicine’). *Vet. Ital.*, 43(1):5-19.
- Kelly A. M., Ferguson J. D., Galligan D. T., Salman M. Osburn B. I. (2013): One health, food security, and veterinary medicine. *J Am Vet Assoc.*, 242(6):739-743.
- Kirovski D., Plavšić B. (2019): Koncept jednog zdravlja u veterinarskom obrazovanju. U 30. Jubilarno savetovanje veterinara Srbije, Zbornik radova, 7-11.
- Mersha C., Tewodors F. (2012): One Health One Medicine One World: Co-joint of Animal and Human Medicine with Perspectives, A review. *Vet. World*, 5(4)238-243.
- Nabarro D. (2012): One health: towards safeguarding the health, food security and economic welfare of communities. *Onderstepoort J Vet Res.*; 79(2):450.
- Natterson-Horowitz B. (2015): A Physician’s View of One Health. Challenges and Opportunities. *Vet Sci.*, 2:23-25.
- Nielsen N. O., Buntain B., Stemshorn B., Evans B. (2014): Public policy and veterinary medicine. *Can Vet J.*, 55:389-390.
-

- Nielsen N. O., Waltner-Toews D., Nishi J. S., Hunter D. B. (2012): Whither ecosystem health and ecological medicine in veterinary medicine and education. *Can Vet J.*, 53:747-753.
- Rabinowitz P. M., Natterson-Horowitz B, J., Kahn L. H., Kock R., Pappaioanou M. (2017): Incorporating one health into medical education. *BMC Med. Educ.*, 17:45.
- Saunders L Z. (1987): From Osler to Olafson. The evolution of veterinary pathology in North America. *Can J Vet Res.*, 51:1-26.
- Saunders L. Z. (2000): Virchow's contributions to veterinary medicine: celebrated then, forgotten now. *Vet Pathol.*, 37:199-207.
- Savić S, Vidić B, Ćirković M, Petrović T, et al. (2014): One Health-Concept for today and tomorrow. *Arhiv veterinarske medicine*;7(2):89-97
- Schultz M. (2008): Rudolf Virchow. *Emerg Infect Dis.*, 14:1480-1481.
- Welburn S. C., Beange I., Ducrotoy M. J., Okello A. L. (2015): The neglected zoonoses--the case for integrated control and advocacy. *Clin. Microbiol. Infect.*, 21:433-443.
- Wilkinson L. (1992): *Animals and disease. An introduction to the history of comparative medicine.* Cambridge University Press.

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