



European Medical Students' Association

Association Européenne des Étudiants en Médecine

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One Health

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The European Medical Students' Association (EMSA) represents medical students across Europe. We envision a healthy and solidary Europe in which medical students actively promote health. EMSA empowers medical students to advocate health in all policies, excellence in medical research, interprofessional healthcare education and the protection of human rights across Europe.



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Problem statement

One Health (OH) is a concept that addresses communication between all living creatures and their shared environment. It adopts an interdisciplinary approach which comprises all life forms and the environment in which these living organisms interact, including food, water, livestock, pets or agriculture. As a result of the development and change of human and animal life as well as the environment, growth of the human and animal population, climate change, migrations to new geographical regions, deforestation, and urbanisation create different interactions. OH as a discipline aims to develop public health outcomes in order to represent the interconnectedness and the complexity of cooperation between living creatures and their surroundings. Based on this concept, it is an approach that requires multidisciplinary work at local, regional, national, and global levels, in order to achieve optimal health outcomes.

The OH concept was introduced in early 2003 with the emergence of Severe Acute Respiratory Syndrome (SARS), revealing that controlled management of the disease requires a multidisciplinary response not only from healthcare professionals but also from actors in related areas. One example for the relevance and need of OH concepts poses the Covid-19 pandemic, showing us that we are part of a holistic system that we need to explore more and develop on it. Relevant areas concerning Covid-19 especially were pandemic preparedness, zoonotic diseases, and vaccinations.

Regarding pandemic preparedness, Covid-19 has proven that efforts to prepare and possibly avoid a pandemic have not been fruitful. Pandemic preparedness before Covid-19 relied mostly on the surveillance of known diseases and human clinical cases, which in many countries is fully paid or supported by the government, with genomic pathogen surveillance slowly making its way into public health (Aarestrup et al., 2021).

Zoonotic diseases can be considered as one of the most important subtopics, due to zoonotic pathogens' transmission pathway from animals to humans via direct contact or through food, water, or the environment. Next to Covid-19, there are over 200 known types of zoonoses that comprise a large percentage of new and existing diseases in humans (WHO, 2020). Zoonotic diseases also stand in a key position in antimicrobial resistance due to the close relationship of humans, animals, and food. On the bright side, even if zoonotic diseases are a major public health problem around the world, some zoonoses are 100% preventable through vaccination and other methods.

Vaccination is one of the main ways of stopping the spread of known infectious diseases, minimising the chances of epidemics and pandemics (Gutiérrez et al., 2012). Most European countries offer free vaccines for children depending on the needs of their country. However, since 1998 there has been a new wave of vaccine hesitancy which during the Covid-19 pandemic reached its peak. In fact, vaccination rates have dropped enough that outbreaks of vaccine preventable diseases have started to reappear (Bechini et al., 2019). The idea of OH vaccines follows the concept that vaccines would



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cross-protect against different pathogen strains, be safe in a wide range of species and be effective across all ages (Gutiérrez et al., 2012).

Other areas of OH include antimicrobial resistance, environmental impact, food production, as well as economic aspects.

Antimicrobial resistance (AMR) describes the ability of microorganisms, such as bacteria, viruses, or parasites to resist the action of an antimicrobial agent, which leads to reduction or elimination of its effectiveness to cure or prevent infections. Due to the spread of drug-resistant bacterial strains, the effectiveness of antimicrobials has become very limited, and the newly produced antimicrobials do not suffice to keep up with the resistance pace. Moreover, poor hygienic conditions, lack of infection control measures, inappropriate food control, and most importantly antimicrobials used in animals encourage the spread of AMR. According to WHO, in some countries 80% of antibiotics are devoted to the treatments of animals (WHO, 2017), which underlines the importance and necessity of a multidisciplinary approach to the issue. As reported by the European Commission, AMR is responsible for an estimated 33,000 deaths per year in the European Union and costs the Union 1.5 billion Euros per year in healthcare costs and productivity losses (European Commission, 2022). However, this issue is not limited to Europe, it is one of the biggest modern healthcare challenges around the world. WHO has declared that AMR is one of the top 10 global public health threats facing humanity (WHO, 2021).

The environment has variable conditions, especially in terms of humidity, fluctuations in precipitation and temperature. Climate change, in terms of increases in atmospheric CO₂ concentrations and temperatures as well as changing precipitation patterns, has negative effects on the environment, manifested in aggravating erosion, a decline in organic matter, biodiversity loss, landslides, desertification, deforestation, and flooding. Consequently, Climate change threatens the ecological and environmental integrity of living systems by causing life-cycle changes in pathogens, vectors, and reservoirs. Moreover, it is responsible for the emergence of unknown zoonotic diseases, altered trophic cascades and disruption of interaction between species in a habitat (Khan et al., 2018). In terms of threats to living systems, humans and their health are also affected by climate change. For example, while climate change concerns everyone, some humans and countries are more exposed to threats than others. Countries with lower gross domestic products emit the least greenhouse gases but suffer the most (Essack, 2018). Climate change impacts increased discrimination against minorities and social inequality. With regard to these consequences, climate change leads the list of the 10 biggest threats to health (WHO, 2021). Thus, humans, animals, and environmental health are all equally threatened by these environmental changes.

Billions of people around the world suffer under the lack of a sustainable food supply. Agriculture is responsible for approximately 25% of global greenhouse gas emissions (Mrówczyńska-Kamińska et al., 2021). The area dedicated to agriculture is as large as the entire continent of America plus China. Half of this area is dedicated to animals and meat production (Ritchie and Roser, 2013). The population growth and the increase of desertification due to climate change will enlarge these problems even more.

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Socioeconomic factors can put individuals at a varying level concerning human health due to differences in disease management, threats of pandemics, access to health services and applications of public health practices (Häsler et al., 2013). Therefore, knowledge about the OH concept has a significant role in developing preventive, responding, anticipating and mitigating strategies to prevent major economic losses. Establishing and operating an OH system for effective disease control in developing countries potentially averts immense annual costs to the healthcare sector by reducing epidemics and pandemics (Berthe et al., 2017). In this sense, a look at the past reveals that during six major outbreaks of highly lethal zoonotic diseases between 1997 and 2009, several billion US dollars in losses per year could have been avoided by introducing an OH approach (World Bank, 2012). Ultimately, the OH economics tool and assessments can provide countries with more options for selecting cost-effective strategies for disease preparation, prevention and response.

Due to the emerging relevance of the stated factors, a better knowledge of causes and consequences in OH approaches is required, especially for health professionals for a meticulous and effective interpretation of interactions and dynamics between humans and the environment.

Our view. Aim

Due to the emerging relevance, we as European medical students believe education about and work on areas that are part of the OH concept are required for a meticulous and effective interpretation of interactions and dynamics between humankind and the environment. Therefore, we aim to increase awareness on the importance of this topic and hope to promote change in the medical and political environment with this policy paper.

Regarding pandemic preparedness, the OH approach suggests that we should expand our research, for instance by creating a collection of samples that makes the human and animal microbiome comparable chronologically and geographically. EMSA as an organisation is composed of future clinicians and researchers. In order to detect diseases early, we aim for education of not only health professionals, but also other population groups in the realm of pandemic preparedness.

There is clear evidence that it is crucial to raise awareness regarding environmental health and prevention and treatment of zoonotic diseases in health professionals. We as European medical students support further establishment of OH literacy in the medical curriculum. Hence, EMSA emphasises the need for the OH approach to not just control ongoing zoonotic diseases but also prevent new ones from coming into existence.

Vaccines offer the chance to minimise the spread and infection of infectious diseases. At the same time, the One Health vaccines approach, incorporating the attributes of cross-protection, safety, efficacy, and the capacity of differentiation, offers an adequate and potent implementation of this construct. With the aim to pursue such a policy, EMSA advocates for less anthropocentric vaccine research in order to join the OH cause.

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In the light of the course of AMR and provided various data, from the regulation of antibiotics prescription, dispensing, and usage to the release of antibiotic agents from animal waste in water, the One Health approach plays a crucial role against antimicrobial resistance. Therefore, EMSA underlines the necessity of conscious and accurate antimicrobial use which can only be achieved through raising public awareness and healthcare workforce training. We believe that approaching AMR through the concept of OH will add on to the existing policy paper related to the topic as well as to the Joint Position on the Spread of Antimicrobial Resistance co-signed by EDSA, EMSA and EPSA. It is important to highlight the further need for Research and Development activities.

Considering the environmental impact, it requires a lot more engagement and structured transitions by all countries, communities and people, even though there are already many projects and initiatives currently running. The current situation in Europe and the invasion of Russia underline the urge to abandon fossil fuels and invest into renewable energies only (Wettengel, 2019). EMSA has been prioritising the topic of climate change for the last years, for example with the release of a policy paper on Climate Change and Health or the integration of the topic into the current European Priorities. Moreover, there have been a variety of other projects related to global warming, such as a Healthy Future Game. As future healthcare professionals, we emphasise that resolute action against climate change is our only chance to avoid a global catastrophe in the next century.

In terms of food production, EMSA advocates for a drastic transition towards a sustainable food system. As the concept of OH points out, scientific, environmental and social as well as educational aspects are essential to be considered in this process. One example is increased transparency with the help of standardised labels for sustainable food production. This transparency in the agricultural sector and a clear commitment to sustainable food production will enable consumers to live a healthier life. In our opinion, a guaranteed and safe food supply for everyone following the OH approach is essential for a stable public health now and in the future.

Regarding economic aspects, highly favourable ratios show that OH investments should be undertaken without delay (Suhrcke et al., 2006). In allocating resources, EMSA encourages decision makers to consider the extraordinarily high returns to pandemic prevention through early detection and effective control of zoonotic diseases at their animal source.

In order to ensure long-term implementation of OH principles into the global framework, theory and practice of OH should find exhaustive inclusion and visibility in the educational curriculum as well as continuous skills' upgradation activities for all specialties. Therefore, EMSA proposes interprofessional education of OH models and programs to teach undergraduate students about connections between animals, humans, and the environment to create novel approaches for the solution of global health issues.

As an example, the OH European Joint Program defines its Strategic Research Agenda towards a multidisciplinary and integrative approach to this topic, understanding medical, veterinary, food and

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environmental sciences teams (European Union, 2019). The goal is to reduce the inefficient use of new techniques, redundant or overlapping research activities and, overall, suboptimal systems, promoting research-based recommendations to policy-makers, industry and citizens. Focusing on Foodborne Zoonoses, Antimicrobial Resistance and Emerging Threats, this program encompasses specific objectives focused on five specific areas, in particular: Analytical method, The study of host-microbe interaction using both in vivo and in vitro models, Epidemiology, Risk assessment modelling and Interventions. As another example, the Sustainable Development Goals offer a unique opportunity for advocacy as well as an integrated methodology. Just as the concept of OH itself, its implementation is dependent on institutional collaboration, joint planning and coordinated comprehensive surveillance, with data and science being cornerstones of that planning, implementation and monitoring.

Given the gap between clinical need and medical education is yet to be properly addressed, EMSA finds the need to promote an open discussion on the topic and calls for a change in curriculum to help medical students access appropriate training with regard to all of the above mentioned aspects.

Recommendations

EMSA encourages researchers and scientists to:

- Broaden their vaccine research so that it covers health of all living organisms
- Actively promote science communication with respect to OH matters
- Support research in multi-sectoral collaborations for OH matters
- Research in projects of decarbonisation while being aware of the tremendous effects on global processes when implementing geoengineering projects and therefore follow the concept of the OH approach

EMSA calls on medical faculties to:

- Integrate education about the concept of OH with its areas into the medical curriculum, focusing on pandemic preparedness, zoonotic diseases, vaccinations, AMR, environmental impact, food production as well as economic aspects
- Promote the introduction to OH principles in the teaching of zoonotic diseases and their prevention during infectious disease coursework early in medical school
- Include concepts of climate change, agricultural intensification, food systems (in particular animal source foods, in human health and disease) and wildlife habitat destruction into the medical curriculum
- Promote the inclusion of OH approaches to clinical anamnesis, such as incorporation of better animal contact histories as well as interrogation of environmental factors and usage of standardised patients and recommended history checklists
- Promote interprofessional education, communication, and skills through collaboration between human, veterinary medical and environmental educational institutions.



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- Guarantee the ability to understand and assess the human-animal-environment interactions in zoonotic diseases
- Educate about the health risks and the environmental impact of consuming animal products
- Promote a conscious and accurate use of antimicrobials to the future health professionals

EMSA appeals to FAO, ECDC, OIE to:

- Collaborate with WHO as well as European governments in terms of the distinct realms of the OH concept

EMSA calls on the World Health Organisation (WHO) to:

- Provide toolkits and frameworks for the implementation of OH measures in different systems
- Research on efficient decarbonisation programs and more regulations from the medical perspective for air pollution and cities
- Promote guidelines that aid healthcare workers in managing climate change related diseases
- Design and implement a global surveillance system for emerging infectious diseases that gives early warnings of pathogen appearance targeting specific risk areas
- Collaborate with the Food and Agriculture Organisation (FAO), European Centre for Disease Prevention and Control (ECDC), the World Health Organisation for Animal Health (OIE) as well as European governments in terms of the distinct realms of the OH concept

EMSA calls on European governments to:

- Increase funding for OH research
- Develop health systems that adapt to the areas of OH
- Tackle zoonotic diseases using tools within the One Health concept, not only in the context of current outbreaks but also in terms of prevention of new ones
- Follow the WHO recommendations regarding usage of antimicrobials in humans and animals
- Enhance monitorings and assessments of AMR, environmental impact and food production
- Statue new policies to lower the emission of toxins, pollutants and other unsustainable products, for example by encouraging, supporting and educating farmers to change their farming into sustainable agriculture
- Support a transition towards a healthier society regarding nutrition with less animal products
- Establish a standardisation of labels for sustainable food production considering the OH approach and including a transparent supply chain
- Focus on proper communication of science to the public and address the fears of people that express vaccine hesitancy
- Invest in the animal health sector in order to reduce disease outbreak and transmission
- Set regional goals for sustainability and climate neutrality for cities and municipalities
- Support the exchange of accomplished climate goals and suggestions for efficient emissions reduction between cities and countries
- Consider climate as an ecological, economical and social crisis which increases inequality and injustice between people and countries

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EMSA commits itself and encourages other student organisations to:

- Advocate for the OH approach and interprofessional collaboration
- Collaborate with student organisations related to the distinct areas of the OH concept, such as students in pharmaceutical, agricultural and sustainability studies
- Promote a healthy lifestyle regarding nutrition with less animal products

Abbreviations

AMR	- Antimicrobial Resistance
ECDC	- European Centre for Disease Prevention and Control
EMSA	- European Medical Students' Association
FAO	- Food and Agriculture Organisation
OH	- One Health
OIE	- World Health Organisation for Animal Health
SARS	- Severe Acute Respiratory Syndrome



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