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Infectious diseases prevention policies, strategies and measures: Literature review

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ABSTRACT

Introduction: Throughout the history, infectious diseases have been the most serious cause of morbidity and mortality of the population worldwide, as over the years there have been–and with the development of human activities–many significant outbreaks of infectious diseases. The threats they pose, including their resistance to antibiotics, make the review and development of public health policies a major issue.

Aim: The main purpose of this article is to present most recent policies and strategies on infectious diseases prevention via a literature review and highlight the necessity of developing a holistic approach to the formulation of infectious diseases prevention policies. Moreover, through the most recent literature on this topic it is observed that there is a need to draw up innovative policies, to defend public health and enforce the one health.

Methodology: For this literature review, a research in PubMed database and official organization was conducted and thus a total number (n=28) of articles and handbooks was collected. From PubMed database n_1=15 articles were extracted while from websites of official organizations n_2=13 was extracted. The final number of references that have been used for this paper was n=33 and were managed by using ZOTERO software.

Conclusion: It is clearly observed that collective work for prevent, and control infectious diseases is mandatory. Also, there is a need for strengthen the already existed public health systems, in order to be well-prepared. A major public health tool is communication, it is very important to communicate strategies and policies to individuals in a proper and comprehensive way.

Keywords: infectious diseases, prevention policies, strategies, measures

INTRODUCTION

Throughout the history, infectious diseases have been the most serious cause of morbidity and mortality of the population worldwide, as over the years there have been- and with the development of human activities- many significant outbreaks of infectious diseases. The threats they pose, including their resistance to antibiotics, make the review and development of public health policies a major issue.

MATERIALS AND METHODS

For this short communication paper a research in PubMed database and official organization was conducted and thus a total number (n=28) of articles and handbooks was collected. From PubMed database n_1=15 articles were extracted while from websites of official organizations n_2=13 was extracted. The final number of references that have been used for this paper was n=33 and were managed by using ZOTERO software.

RESULTS

Waterborne & Foodborne Diseases Prevention Policies & Strategies

Waterborne diseases

In regards to waterborne diseases, it is imperative that all actors cooperate–not only in local and regional level but also in national level–in order to provide correct maintenance of the infrastructure of the water supply across the water supply system. Frequent sample collection of water for investigation concerning waterborne diseases should be promoted in order to achieve the best possible practices for their elimination [1]. Raising public awareness and promoting model aquatic health code constitute the most fundamental measures of prevention because people learn new ways to protect themselves from

waterborne diseases, especially when it comes to public pools and hot tubs in complex apartments, hotels, gyms and waterparks [2]. In addition, point of care devices may lead to rapid detection of diseases providing accurate results [3].

Foodborne diseases

Concerning the restriction of the dispersion of foodborne diseases, one of the most crucial measures of prevention is the application of measures of sanitation like washing hands, even from younger ages, as the dirty hands contribute to the instant transmission of pathogens. When it comes to food, the consumption of food not properly cooked should be definitely avoided and rules for proper maintenance and cleaning should be followed strictly. Decontamination of the kitchen surface is indispensable after the use of poultry [4]. Also, it was presented an innovative strategy is the application of the world genetic system [5]. It is a laboratory procedure that may locate and identify a pathogen microorganism in food while it is used for preventive detection of food pathogens in imported and exported food with aim to avoid a possible pandemic [5].

Zoonoses Prevention Policies & Strategies

The prevention of zoonotic diseases relies on the application of measures of sanitation. The fundamental objective is washing hands correctly, which constitutes the prompt intervention of treatment [6]. Furthermore, it is essential to raise awareness of the public providing simple information concerning the security around pets (how to deal with food, feces, bites, & scratches) as well as possible incidents that may occur in zoos or parks. It is indispensable that systematic surveillance of zoonotic diseases is advanced, therefore, basic strategies of prevention are adopted:

1. PREZODE (PREventing ZOonotic Disease Emergence): It is a universal program of prevention and extinction of zoonotic diseases. It aims at the support of international organizations and countries worldwide, especially, countries of low income [7].
2. GOHF (Generalizable One Health Framework): It includes a series of actions based on which the countries may develop a system of coordination and planning in all areas of interest regarding any zoonotic disease [8].

Airborne Diseases Prevention Policies & Strategies

According to Centers for Disease Control and Prevention (CDC) [9], in order to prevent the spread of an airborne pathogen, both patients and those around them have to wear a protective mask. Moreover, airborne disease spread can be controlled by isolating patients with an airborne pathogen in AIIR (Airborne Infectious Isolation Room), which are specific rooms, constructed based on special guidelines. Respectively, when a patient is located in a household, he can be isolated in a different room in the house from the others. Regarding the healthcare workers, the studies in [9, 10] mention that they should not only use face masks but make all vulnerable target groups to get vaccinated against respiratory system diseases. However, prevention policies should get applied wisely, because they have an impact on health and socioeconomic systems. For example, during the COVID-19 pandemics the most common policy was the lockdowns, which according to [11], it should have been implemented in a regional scale and not universally in order to maintain the economy of each country. Improvement of indoor air quality by monitoring the concentration of the indoor CO_2. The last two years, there has been an association between the concentration of indoor CO_2 and the transmission of airborne pathogens. More specific, the study in [12] explains that keeping in low concentration the indoor CO_2 it is less likely to have an airborne pathogen transmission due to the difficulty of the transmission in outside places while keeping social distances.

Vector-Borne Diseases Prevention Policies & Strategies

According to [13], the prevention of vector-borne diseases is a multifactorial issue. In European countries, prevention focuses on the strengthening of active epidemiological surveillance, various molecular approaches such as NGS and phylogenetic tracing studies. It was mentioned that this multifactorial approach significantly help in the identification of pathogens [14]. There is also mention of the use of chemical insecticide formulations as well as continuous research on the resistance of vectors to them [14]. On the other hand, in the US the prevention of vector-borne diseases arises from a combination of controlling the vectors and the protection of the population against these specific diseases. In addition, it is recommended to strengthen epidemiological observational studies for collecting data on existing prevention policies, epidemiological surveillance of insects, especially mosquitoes, and data on the resistance of carriers to insecticides [15].

Sexual Transmitted Diseases Prevention Policies & Strategies

Compared to other regions of the world, Europe has the lowest incidence of sexually transmitted diseases (STDs) according to WHO, nevertheless, prevention measures exist. According to ECDC [16], primary prevention of STDs involves initially educating the population, especially those who work in the fields of health and education, about sexual and reproductive health as well as the risks associated with STDs. At the same time, vaccinations against hepatitis A and B in children and against HPV are carried out [17]. Furthermore, the use of condoms during every sexual act is recommended, as well as reducing sexual partners through educational interventions within the framework of safe sex [16]. In addition to the above-mentioned classical prevention methods, new programs are being implemented, such as pre-exposure prophylaxis for HIV, which involves administering a drug that is a stable combination of nucleoside reverse transcriptase inhibitors, tenofovir and emtricitabine, to high-risk groups instead of using condoms. Another program is the diagnosis-as-prevention approach, which involves the use of rapid diagnostic tests for HIV before sexual contact if the individual does not wish to use condoms.

Hospital Associated Infections & Antimicrobial Resistance Prevention Policies &d Strategies

Prevention of nosocomial infections, according to ECDC and CDC [18, 19], is carried out through educational programs aimed at informing and educating both health professionals and patients. The aim of these programs is to inform the medical staff and patients about infections in the hospital and how they can be protected from them, as well as about the

phenomenon of antimicrobial resistance. In order to combat this phenomenon, instructions are given starting from the correct administration of antibiotics by the attending physician to their correct use by the patient Furthermore, in both Europe and America, hygiene and personal protection measures are emphasized. Prevention policies focus on proper cleanliness of health units (wards, toilets, operating rooms, machines, waiting areas) [20], hand washing, isolation of carriers and finally use of personal protection measures by the personnel of the health structures such as the medical apron, surgical mask, gloves and protective glasses [21, 22]. Moreover, CDC additionally recommends preventive vaccination of personnel for vaccine-preventable diseases [21]. Finally, it is worth mentioning the surveillance network of infectious diseases associated with health services (HAI-Net) in Europe, whose main objective is to record all infections related to health units, including the use of antimicrobial drugs with the aim of imminent prevention [23].

Emerging & Re-Emerging Infectious Diseases

Prevention policies implemented to limit emerging diseases in Europe focus on early identification of these in travelers and immigrants from highly endemic countries. On the one hand, emphasis is placed on the correct collection of travel histories by medical and nursing staff. This policy aims to guide treating physicians towards the correct diagnosis and prevention of a possible emerging infection in the population. On the other hand, an important preventive measure is the medical care of immigrants, either through preventive vaccination or through their full inclusion in the health systems. With their full inclusion, an early diagnosis of the disease can be made and thus prevent its spread. In US, the policies implemented are oriented towards informing the public about emerging diseases. More specifically, the CDC follows the One Health strategy, a program that includes several scientific specialties with the goal of informing citizens both about the diseases that can be acquired from different types of animals and ways to avoid their spread [24].

Neglected Tropical Diseases Prevention Policies & Strategies

Prevention policies and strategies of NTDs are quite similar both in EU and US, including vector surveillance programs and the implementation of strategic plans based on the needs of each region. Due to climate change and its impact on the dynamics of infectious diseases, there is an urgent need for alterations in these surveillance programs. The studies in [25, 26], it was mentioned that recreating present prevention policies and combining them with the mathematical modelling of climate risks might aid at the prevention of NTDs. Also, it is crucial to mention the role of epidemiological surveillance of infected patients, which aids not only at their tracing but also according to [27], it aids at the recreation of present prevention policies like the drug disposal. Given the fact that, many NTDs can be transmitted via the food chain there is a necessity for an improvement in the food processing. In [28], this preventive strategy was developed by highlighting the risk reduction by the improvement of HACCP and the food processing in general. More specific, his study analyzes the usage of antiparasitic drugs for helminths against their growth cycle.

Vaccine Preventable Diseases Prevention Policies & Strategies

Immunization against VPDs is the second most effective public health intervention in terms of prevention [29]. English public health system, has planned for the next years to increase vaccination levels among the population, underlining the fact that many deaths and outbreaks could be detected earlier [30]. Furthermore, according to [31], the surveillance of VPDs is a worldwide strategy for 2023 mentioning its importance in the eradication of infectious diseases. In [32], it was presentsed the effectiveness and the importance of healthcare personnel (HCP) vaccination by stopping the transmission of infectious diseases from HCP to patients. For this reason, the need for a global immunization have been created and CDC has created programs as part of their strategy to achieve the enhance of immunization and VPDs surveillance [33].

CONCLUSIONS

In order to prevent infectious diseases, there is a need for a corporation between authorities and stakeholders and a strengthen in the already existed systems. As the phenomenon of climate change increases, and more pathogens are arising, it is critical to build up the public health systems including the epidemiological and laboratory surveillance of infectious diseases and also, develop early detection models of outbreaks in both national and international level.

The key in public health policies and strategies is population vigilance. All individuals have to show compliance with the guidelines, be properly informed about public health topics and engage with responsibility when there is a need.

Author contributions: CK: contributed to literature research, data collection & analysis, writing sections of airborne diseases & neglected tropical diseases & wrote manuscript; **AP:** contributed to data analysis & writing sections of emerging infectious diseases & hospital-associated infections; **SP:** contributed to data analysis & writing sections of waterborne diseases, foodborne diseases, & zoonoses; **MA:** contributed to writing sections of sexual transmitted infections & vector-borne diseases; & **ES:** contributed by providing guidance on review & revised manuscript for intellectual content. The authors agree with the results and conclusions.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from corresponding author.

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