

## Emerging, re-emerging and neglected infectious diseases

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Infectious diseases are a substantial problem in public health and economic stability for people along the time all over the world. They have been considered for long periods among the primary causes of death and opened rising defies to health safety and human evolution [1]. Regarding global health concern, serious challenges have risen from infectious diseases, including the emergence and re-emergence of old and new infectious diseases. Emerging infectious diseases (EIDs) are defined by the i) outbursts of formerly unidentified diseases, ii) recognized illnesses that are quickly growing in occurrence or geographical range, and iii) persistence of uncontrolled infectious diseases. Among them, can be mentioned SARS, *Escherichia coli*, Hantavirus, dengue fever, and the Zika virus, among others. The Re-Emerging infection diseases (REIDs), those that re-appear after having exhibited a significant decline, may be due to a failure in public health actions for preserving diseases under control. Also, the re-emergence may be due to the appearance of new strains of identified causal organisms of these diseases. Some diseases, originally curable and well-regulated and may return; for example, the abuse of antibiotics leads to organisms that are resistant to medicines determining their re-emergence. Among REIDs, malaria, tuberculosis, cholera, pertussis, influenza, pneumococcal disease, and gonorrhea can be pointed out.

The prevalence of EIDs and REIDs are predisposed by a variety of factors, including human behavior, microbial adaptation, ecology, globalization, and public health setup. In addition, most of these factors could be associated with the increasing number of human populations, overcrowding in cities with poor sanitation, fast and intense international traveling, changes in the handling or processing of food, and increased exposure of humans to microbial carrying vectors and reservoirs in nature [2]. Emerging, re-emerging and neglected infections constitute some of the utmost lethal diseases, reaching to mortality rates up to 80 per cent, in particular ranging from 10-80 % [3]. Notwithstanding the high mortality due to several of these infections, a small percentage of the biomedical research community's efforts is performed to solve this problem. Probably, the low incidence of some of these infections determine not as much of public attention and funding. On the other hand, an evolutionary, environmental, or wicked alteration of causal agents of emerging infections could allow accelerated spread amongst the human population. Moreover, these diseases do not respect political restrictions [3,4]. Indeed, we agree that all the international research community must direct suitable attention to studying these diseases and their causative agents.

Lastly, infectious diseases are been emerging or reemerging almost every year. This tendency will continue caused by a number of factors, comprising the augmented global population, aging, urbanization, travel, and climate change, favoring the emergence, evolution, and spread of novel pathogens. From the technical point of view, the tactic used so far for EIDs has not been sustainable. But vaccine producers offer an opportunity to develop novel vaccines quickly, reducing the investment to build industrial facilities. Also, a rapid development of human monoclonal antibodies could become a potent speedy response to emergencies. Up to now, numerous schemes for EIDs have been proposed by scientists, from different sectors, but all partners have to coordinate a global strategy yet [5].

Taking into account that travel has always been a channel to the spreading of disease across the world, when there are incidences of EIDs or REIDs, most countries will tense up their restrictions, limiting immigration and initiating strict shadowing on the products confiscated at airports and ports from travelers. Recently, the EID COVID-19, has spread from Wuhan, China to many countries

worldwide by global traveling and migration [6-8]. Vaccine strategies and technical platforms used for the COVID-19 pandemic have been examined in the context of those used for previous EIDs and REIDs. Vaccine manufacturing and distribution are complex and challenging. Rapidity is vital, clinical development to emergency use authorization and licensure, pharmacovigilance of vaccine safety and following of virus variants are also critical. The combination of all these factors will determine the eventual success to bring the current and any future EIDs pandemics to the end, using antigen mapping, metagenomics and next generation sequencing approaches [9,10]. However, it is worth noting that the access to vaccines and vaccination needs to be prioritized in low- and middle-income countries. Regarding vaccine advances, proposals aim to ease high regulatory complexity and heterogeneity surrounding the manufacturing and distribution of vaccines, by supporting the use of i) science and risk-based strategies, ii) global regulatory synchronization, iii) use of trust, work-sharing, and recognition processes and iv) digitalization. The authors propose that these steps will in the end benefit the world by turning vaccines into vaccination, ensuring the health of everyone [11].

Regarding the transmission route, several EIDs have resulted from animal-to-human transmission. The transmission of a pathogen between animals and humans is known as zoonosis [12]. Zoonosis is recognized as one of the most dynamic pathways for the emergence of new infectious disease to humans. It was reported that about 75 % of all known EIDs are originated from some type of animal reservoir [13,14]. Some examples of zoonotic disease include HIV/AIDS, SARS, MERS, several hemorrhagic fevers, Lyme disease, plague, and avian or swine origin influenza [15-19]. Each of them possesses a unique etiology and a direct or indirect transmission route. Humans have a high chance to become infected due to their close contact with asymptomatic or sick animals carrying the new pathogen. However, effective control of zoonotic diseases is predominantly difficult; since distinguishing an emerging zoonotic disease often does not occur until a main outburst is persistent [13]. Then, if the responsible zoonotic pathogen is highly transmissible, future epidemic spread will occur even after recognition. An augmented interaction between humans and animal habitats can result from this growth predominantly due to a pronounced zoonotic disease potential [20].

Unfortunately, certain pathogens or microorganisms related to EIDs or REIDs have been early used as bioweapons to cause the threat of bioterrorism via release of such viruses, bacteria, or other agents leading to additional complexities in how EIDs or REIDs affect global health. These events influenced dramatically on public health procedures and source provisions. Among bioterrorism agents used to cause attacks can be mentioned anthrax, smallpox, melioidosis, glanders [21, 22]. Innovative research and technology have provided better diagnostic skills as well as understanding to divide different factors and causes regarding pathogenesis, virulence, cytotoxicity, and micro-host interaction, which still persist unknown or not yet fully understood, requiring still more efforts to address these pathogenic factors and their adequate processes [23].

In accordance with several reports, ecology or etiology of EIDs or REIDs are very complex, requiring an intellectual and interdisciplinary response to diminish the disease impact. In this sense, one strategy to address these complexities has been created 'One Health' [24, 25]. One Health is a tactic used for designing and applying programs, policies, legislation, and research in which multiple sectors communicate and work together to accomplish better public health outcomes. One Health is also a nickname for the interdisciplinary strategy, bringing together human, animal, and environmental health

professionals to address complex global health problems [26]. Inclusive, One Health is considered an important approach to improve the effectiveness of public health response and interventions as well as recruitment and application of multiple areas of expertise to work together to combat against EIDs or REIDs.

Updates on emerging and neglected infectious diseases have been presented in the last years, emphasizing the opportunity, changing aspects, and loans in infectious disease managing with precise focus on the top priority emerging EIDs, REIDs and neglected tropical infectious disease (NTIDs) [27]. Globally, among health organizations that led multiple campaigns to completely eradicate specific infectious diseases via vaccination campaigns can be mentioned the USA Centers for Disease Control (CDC) and the World Health Organization (WHO) [28]. Besides, it is worth mentioning that an interesting special issue was presented resuming some Neglected and Emerging Tropical Diseases in South and Southeast Asia and Northern Australia [29].

In recent years, the representative outbreaks of emerging and re-emerging infectious diseases since 2000 and outbreaks of various infectious diseases that have occurred around the world have been described. Some EIDs and REIDs, such as the Ebola virus disease and Middle East Respiratory Syndrome (MERS), have been regularly reported. Mainly, the disease features, routes of infection and the suitable infection prevention methods for mosquito-borne infectious diseases, viral hemorrhagic fever and severe fever with thrombocytopenia syndrome, avian Influenza and MERS have been reviewed in detail. An adequate understanding of all these points will favor the self-protection of healthcare workers that are at high risk of infection [30].

NTIDs have traditionally lacked adequate attention in international public health efforts, leading to unsatisfactory prevention and treatment options. However, some early revision comparing history, promise and restrictions of two worldviews of Neglected tropical diseases NTDs and EIDs was presented [31]. NTDs that are also categorized as EIDs or REIDs, are an even more serious threat and have not been adequately examined or discussed. Emerging and Re-Emerging neglected tropical diseases (ENTDs and RENTDs, respectively) have been reviewed. In addition, the procedure and innovation environment that could impede or enable control efforts have been properly examined [32]. A recent letter to the editor informed that there is a receptor named P2X7 that is a target for treating American Trypanosomiasis or Chagas disease and COVID-19. It is proposed that a selective antagonist for this receptor could be used as novel drug to diminish the inflammatory response evolution, as an alternative treatment for both diseases, focusing on the decrease of pro-inflammatory cytokines [33].

It is worth mentioning that even though NTDs are endemic and EIDs being epidemic, in order to prevent both disease groups successfully, they share essential health determining factors; to be precise: neglect, poverty, a lack of access to clean water and hygiene facilities, in conjunction with a lack of or a harshly limited provision of healthcare. Therefore, a more all-inclusive approach to addressing these two disease groups must be considered, concluding that their cohesions mean that the Global Health community should force chances and labors in the prevention and elimination of both kinds of diseases [34]. In the last years WHO presented an inform related with NTDs since 2021 to 2030, including two annexes, the first one presenting all the assessment for each neglected tropical disease and the second related with the proposed road map targets, milestones and indicators [13].

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