EDITORIAL

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EMERGING INFECTIONS IN CONTEMPORARY TIMES; WHAT DOES THE FUTURE HOLD?

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An emerging infectious disease is one that is found in a human population for the first time or that has recently expanded into a new geographical location.[1] It also refers to a known pathogen newly appearing in resistant form.[1] The majority of these infections are zoonotic in nature and tend to emerge following the complex interactions between pathogens, their host (human or animal) and the environment.[2] All these actors largely exist in equilibrium in nature until this delicate balance is upset leading to the emergence of new infectious diseases from time to time.

The pathogen factors responsible for the emergence of new infections are modulated by changes at the genetic level and are often an evolutionary response to perceived existential threat or to aid their survival. An example is mutations that enable cross species transfer from an animal to human host. Similarly, there are a myriad of host variables such as genetic features that reduce or increase susceptibility in an individual host or an entire host population.[3] There are several interactions between (human) hosts and the environment that contribute to the emergence of new infections. Activities such as deforestation, large-scale construction and industrialized farming which disturb the natural habitat of animals can be a catalyst for the emergence of new infections. These activities displace animals which serve as natural reservoirs for potential emerging pathogens, forcing them into areas inhabited by humans to forage for food and find new habitations. Likewise, the process of carrying out the above-described activities in the environment leads humans into these largely uncharted spaces. These human activities are often for economic development and to accommodate growing populations; they put a strain on natural resources leading to shortages in essential resources such as land, food, and water. Ultimately, both humans and animals are jostling for scarce resources resulting in on-going harmful exposures for humans. Another very important aspect of human activity that contributes significantly to the emergence of new infections is international travel for obvious reasons.

Since May 2022, the has been a global resurgence of mpox. Historically endemic in central and western African countries, it has since been reported in several non-endemic countries with majority of the affected persons having no antecedent travel to endemic areas thus suggesting the establishment of local transmission. It also highlights the important role that fast and efficient travel plays in the emergence of an infectious disease in a new location. According to the World Health Organization (WHO), mpox cases have been reported from 117 countries across all six WHO regions with a tally of 94,707 confirmed cases and 181 deaths as of 29 February 2024.[4] Notably, one country, Cambodia, reported her very first case in February 2024.[4] Outside mpox endemic areas, the main group of individuals affected by the disease are men who have sex with men (MSM). An observational analysis of patients diagnosed with mpox at a sexual health clinic in the UK by Girometti et al found that all of them identified as MSM, 94% of them had ano-genital mpox lesions and a quarter of them had a concomitant sexually transmitted infections (STI).[5] Taken together, these suggest sexual transmission of mpox and that high-risk sexual practices might be a factor in transmission in the MSM population. These might be the origins of stigma associated with mpox as is also seen with HIV and other STIs. The WHO changed the nomenclature of the disease from monkey pox to mpox in November 2022 in attempt to address stigma associated with the disease.

Nigeria is experiencing an mpox outbreak which began in 2017. Between June and December 2022, Nigeria contributed more cases to the global case count of patients with mpox than any other African country.[4] Also of note, while Africa was responsible for only 3% of the cases of mpox in the global outbreak, 12% of the deaths associated with the disease were from the region.[4] This high mortality rate is not uniform across endemic African countries as the Congo Basin clade (found in Central Africa) tends to be more virulent than the West African clade (found in West Africa). The disproportionately high mortality in African countries is concerning and should motivate increased readiness and response to emerging infectious diseases in Africa and similar settings. In this issue, Bakare et al explore the level of awareness, knowledge, and risk perception in communities across three states in Nigeria. They found significant knowledge gaps and very low levels of awareness in these communities.

With the backdrop of a protracted outbreak with a high case count at the start of the global outbreak, it appears that efforts to educate the public in Nigeria about mpox have been insufficient. Using Nigeria as an example, there have been significant upgrades to infectious disease surveillance, molecular diagnostic capacity, contract tracing, disease reporting, case management and information dissemination since the 2014 Ebola experience and more recently the COVID-19 experience. It is essential that this infrastructure is leveraged on an on-going basis to address infectious diseases as they emerge.

Lassa fever, a viral hemorrhagic fever (VHF) endemic in Nigeria, Benin, Ghana, Guinea, Liberia, Mali, Sierra Leone, and Togo is another infectious disease that has been on the rise in recent years.[6] In at least three of the countries above, it was only diagnosed for the first time within the last decade. Since the Lassa virus was isolated in 1969, Lassa fever has gone from a seasonal disease with peaks in the dry season in a few West African countries to a disease which is diagnosed throughout the year in an increasing number of countries in the region. It has now been reported in almost all of Nigeria's 36 states. The increase in the number of reported cases is due to a variety of reasons. One important reason is that there has been improved case finding and increased capacity for molecular diagnosis of the disease. As reported by Olasoju et al in this issue, poor sanitary conditions in rural areas and the effect of conflict (internally displaced persons [IDP] camps) provide an enabling environment for the acquisition and spread of Lassa fever. The role of conflict in the rise of emerging infections cannot be over-emphasized. Conflict often leads to restriction of access to safe and adequate water supplies, need for sub-optimal temporary housing such as IDP camps, loss of access to essential medicines and healthcare facilities and interruption of outreach vaccination programs. Reductions in vaccine coverage have been postulated as the cause of re-emergence of vaccine preventable diseases like diphtheria and measles.

There is no doubt that we are in an era of emerging infection pandemics and our readiness to identify these threats and promptly institute countermeasures will ultimately determine the ensuing morbidity and mortality. The factors and conditions which favor infectious disease emergence and re-emergence remain present and, in some cases, more so than ever before. Climate change is an issue that many developing nations are yet to come to terms with and address head on. Even though lower income countries have a smaller carbon footprint and contribute less to climate change than industrialized countries, it is important that all hands be on deck (including developing countries) to arrest climate change and prevent the potential fallout from it. In addition, as alluded to above, conflict within and across national borders continue to constitute a problem by contributing to emergence of new infections. Unfortunately, causes of conflict are complex with unrest and disputes spanning generations thus making resolution challenging and difficult to achieve. Harsh global economic conditions also indirectly contribute to disease emergence by triggering increased mobility among economically active individuals. It appears that movement of migrant workers, frequent local and international travel and various activities related to income generation and economic development will persist for the foregoing. Notably, in certain regions, human movement and migration is unregulated and unchecked and occurs across porous borders. Suffice it to say that as populations continue to expand and human behavior continues to evolve, we can expect infectious diseases to continue to emerge or re-emerge.

The response to infectious disease emergence needs to be pre-emptive, comprehensive, data driven, well-resourced and adaptable. A One Health approach takes into consideration human, animal, and environmental factors in crafting a preparedness response to emerging infections. Targeted surveillance of animal hosts in which certain types of pathogens are known to circulate can give clues about what pathogens might be poised to emerge in the future. Close observation of reservoir animal populations while paying close attention to how seasonal and climate conditions affect them and their environment might also give clues about the risk of potential transmission events from animals to humans.

Responses must be driven by data collected during an outbreak as well as historical data. The understanding of transmission dynamics early after the emergence of a new infectious disease is important in developing preventive interventions. Another key component of management of an emerging infectious disease outbreak is effective risk communication and community engagement. There must be clear and effective dissemination of information in a timely manner. As seen with the COVID-19 pandemic, where official information is missing or delayed, a vacuum is created and is readily filled with false and inaccurate information. The knowledge provided by the appropriate authorities may help the public to dispel myths and limit stigma. The wide reach of social media provides a unique opportunity for reaching large numbers of people quickly and efficiently. However, traditional forms of media such as radio and print should still be used to ensure wide reach. There must be strong political will in addressing emerging

infections. It is imperative that political leaders at all tiers of government are brought on board. Traditional rulers in African settings should also address harmful traditional practices that have been linked to the spread of disease such as traditional burial rites during the ebola outbreak of 2013-2016. Adequate resource (human, financial, administrative et cetera) allocation is another way by which leaders can express their commitment to addressing emerging infections.

At the point of patient presentation with disease, there is an urgent need to confirm the diagnosis. For newly emerging infections there is a need to identify the pathogen responsible for the infection and then develop diagnostics for making accurate diagnoses subsequently. Point of care diagnostics are particularly useful in rural areas where many of these infections tend to emerge from. Research is also very important in emerging infectious disease even in the setting of an on-going outbreak. It can help to elucidate the pathogenic mechanisms of the diseases and lead to discovery of diagnostic and therapeutic targets for these disease conditions. Research is also important for understanding transmission, prevention, and other aspects of the new disease process.

Lastly, on-going assessments of response to management of infectious diseases outbreaks such as the After-Action Review carried out by Okoeguale et al at Irrua Specialist Teaching Hospital and published in this issue is a way of auditing outbreak response and giving feedback to the system. Emerging infection responses may follow the same principle from one disease to another but will vary based on the exact pathogen. Therefore, the ability to adapt responses to different infectious disease outbreaks is important for an effective response.

In conclusion, it is safe to say emerging and re-emerging infections are here to stay and the onus lies on us to mitigate the impact they could have on human populations.

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