ROLES OF NIGERIAN EDUCATIONAL INSTITUTIONS IN THE PREVENTION AND CONTROL OF EMERGING INFECTIOUS DISEASES IN SCHOOL

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ABSTRACT

Educational institutions cannot achieve their primary mission of education if students and staff are not healthy and fit physically, mentally, and socially. Thus, controlling emerging infectious diseases in educational settings is of utmost importance. Providing a safe, comfortable, and healthy environment facilitates the educational process, encourages social development, and allows students to acquire healthy attitudes toward school. This paper focused on roles of Nigerian educational institutions in the prevention and control of emerging infectious diseases in school. It explained the concepts of emerging infectious diseases, and infection control. Classifications of emerging infectious diseases, and factors in the emergence or re-emergence of infectious diseases were discussed. Also, variables of infectious disease spread, and some protocols and guidelines to minimize the spread of infection within a population were highlighted. The paper gave overview information on roles of educational institutions in the control of emerging infectious diseases. Similarly, some essential elements of an educational institution health programme were discussed. In conclusion, it was suggested that Nigerian educational institutions should undertake health education programme on emerging infectious diseases to help students adopt healthy behaviours and lifestyle, eliminating or mitigating risk factors that influence spread of diseases, as well as promoting health and improving quality of life.

Key Words: Disease prevention, Control, Educational institutions, Emerging diseases, Infectious diseases.

Introduction

Infectious diseases remain the leading cause of morbidity, disability, and mortality worldwide. Primary, secondary, and postsecondary educational institutions form a special group that features high population density and close interpersonal contact, easily causing outbreaks of infectious diseases in the absence of timely control (Wang et al., 2018). As a gathering place for young people, educational institutions display characteristics of a largely susceptible population, frequent contact, and gathering age. They are a place where outbreaks of infectious diseases, especially respiratory diseases, may occur. Epidemics or outbreaks of infectious diseases in

educational institutions not only affect teaching order, resulting in an adverse social effect and negatively affecting young people's physical and mental health (Cong et al., 2011). According to Yang (2015), studies showed that more than 70% of public health emergencies, which are situations that pose a risk to the health of a community and require immediate action, in some countries occur in educational institutions, with most emergencies being infectious disease events.

Emerging Infectious Diseases (EID) are defined as infectious diseases that are newly recognized in a population or have existed but are rapidly increasing in incidence or geographic range. Simply put, they may be new infections resulting from changes or evolution of existing organisms, known infections spreading to new geographic areas or populations, previously unrecognized infections appearing in areas undergoing ecologic transformation, or old infections reemerging because of antimicrobial resistance in known agents or breakdowns in public health measures (Center for Disease Control and Prevention, 2018). According to Baylor College of Medicine (2023), emerging infectious diseases are infections that have recently appeared within a population or those whose incidence or geographic range is rapidly increasing or threatens to increase soon. Specific categories include those newly emerging, those that have become established and may periodically reemerge, and those that have become stably endemic (Donna, 2019).

Morens and Fauci (2020) indicated that EIDs could be caused by newly identified microbes, including novel species or strains of viruses (e.g., novel coronaviruses, Ebola viruses, and HIV**)**. Some EIDs evolve from a known pathogen, as occurs with new strains of influenza. As occurs with West Nile fever outbreaks, EIDs may also result from spreading an existing disease to a new population in a different geographic region. Some known diseases, such as Lyme disease, can also emerge in areas undergoing ecological transformation (Kilpatrick et al., 2017). Others can experience a resurgence as a reemerging infectious disease, like tuberculosis (following drug resistance) or measles (Fraser-bell, 2019). Nosocomial (hospital-acquired) infections, such as Methicillin-resistant *Staphylococcus aureus*, are emerging in hospitals and are highly problematic because they are resistant to many antibiotics (Morens & Fauci, 2020). The challenge of EID relates to its impact on humans, including pandemics, epidemics, and threats to human health and global stability (Donna, 2019). These diseases' societal and economic impact is phenomenal, not to mention the quality of life among infected individuals and their families.

According to Macapagal and Manlapaz (2020), infection control is a discipline concerned with preventing harm caused by infectious pathogens. Control of infectious diseases refers to the actions and programmes directed towards reducing disease incidence (new infections), reducing disease prevalence (infections in the community at any given point in time), or completely eradicating the disease (Robert, 2015). According to Robert (2015), control to reduce the incidence of infectious disease or their risk factors can be considered primary prevention. Primary prevention protects health through individual and community-wide measures, including maintaining good nutritional status, keeping physically fit, immunizing against infectious diseases, providing safe water, and ensuring the proper disposal of faeces. Control aimed at reducing the prevalence by shortening the duration of infectious disease can be secondary prevention.

Secondary prevention corrects departures from good health through individual and community-wide measures, including such actions as screening that results in early detection of disease, prompt antibiotic treatment, and ensuring adequate nutrition. Control aimed at reducing or eliminating long-term impairments of infectious disease can be considered tertiary prevention. Tertiary prevention reduces or eliminates disabilities, minimizes suffering, and promotes adjustment to permanent disabilities by providing orthopedic appliances (such as wheelchairs, crutches, or braces) and associated rehabilitation for poliomyelitis victims, counseling and vocational training (such as job skills training or career counseling), and prevention of opportunistic infections (Robert, 2015).

Effective infection control practices are crucial in reducing the transmission of infections. In healthcare and public health practice settings, these measures include hand washing, infection control standards, precautions for different modes of transmission, decontamination procedures, and control of infection vectors. The prevention of infections, epidemics, and pandemics of international concern is rooted in these effective infection prevention and control measures, providing a sense of reassurance (WHO, 2020).

Classification of Emerging Infectious Diseases

Morens and Fauci (2020) indicated that one way to classify emerging infectious diseases is by time and how humans were involved in the emergence; standard classifications include:

- Newly emerging infectious diseases: Diseases that were not previously described in humans, such as HIV/AIDS.
- Re-emerging infectious diseases: Diseases that have spread to new places or which previous treatments no longer control, such as Methicillin-resistant *Staphylococcus Aureus*.
- Deliberately emerging infectious diseases: Diseases created by humans for bioterrorism, such as Anthrax attacks.
- Accidentally emerging infectious diseases: Diseases created or spread unintentionally by humans, such as vaccine-derived poliovirus.

Factors in the Emergence or Re-emergence of Infectious Diseases

Many factors are involved in emerging new infectious diseases or re-emerging "old" infectious diseases. Some result from natural processes, such as the evolution of pathogens over time, but many results from human behaviour and practices. Baylor College of Medicine (2023) noted that many emerging diseases arise when animal infectious agents are passed to humans (zoonosis). The case of the coronaviruses SARS-CoV, MERS-CoV, and SARS-CoV-2 (which cause the diseases SARS, MERS, and COVID-19, respectively) represents instances of how viruses can move from animals into humans, acquire the ability to spread from person to person and then, with great speed, reach around the globe as a result of air travel. These three viruses, which all cause severe respiratory illnesses and can be fatal, originated in bats and spilled over into the human population through close contact with an intermediate animal. SARS emerged in China in 2002, MERS in the Arabian Peninsula in 2015, and COVID-19 in Wuhan, China at the end of 2019 (Baylor College of Medicine, 2023). As the human population expands in number and into new geographical regions, the possibility that humans will come into close contact with animal species that are potential hosts of an infectious agent increases. When combined with increases in human density and mobility, the combination seriously threatens human health.

Similarly, Donna (2019) noted that climate change is increasingly becoming a concern as a factor in the emergence of infectious diseases. As Earth's climate warms and habitats are altered, diseases can spread into new geographic areas. For example, warming temperatures allow mosquitoes - and the diseases they transmit- to expand their range into regions where they previously have not been found. According to Baylor College of Medicine (2023), a significant

factor in the re-emergence of diseases is antimicrobial resistance - the acquired resistance of pathogens to antimicrobial medications such as antibiotics. Bacteria, viruses, and other microorganisms can change over time and develop a resistance to the drugs used to treat diseases caused by the pathogens. Another factor that can cause a disease to re-emerge is a decline in vaccine coverage. Even when a safe and effective vaccine exists, many people choose not to become vaccinated. This has been a particular problem with the measles vaccine. Measles, a highly contagious and severe infection that was eliminated from the U.S. in 2000 and from the Western Hemisphere in 2016, has returned in certain areas due to an increase in the number of people opting to take nonmedical vaccine exemptions for reasons of personal and philosophical belief (Baylor College of Medicine, 2023).

A combination of factors, including high population densities, increased travel, closer contact with wild animals, weak healthcare systems, and a slow response, led to the worst outbreak of Ebola the world has ever seen. Additionally, there is the potential for diseases to emerge as a result of deliberate introduction into human, animal, or plant populations for terrorist purposes (Bioterrorism Agents). These diseases include Anthrax, Smallpox, and Tularemia (Baylor College of Medicine, 2023). Similarly, Donna (2019) indicated that biological, social, and environmental drivers of emerging infectious diseases, which are interrelated, include the following:

- Microbial adaptation and change (e.g., genetic drift and genetic shift in influenza A).
- Changing human susceptibility to infection (e.g., due to Mass immuno compromisation with HIV/AIDS, human demographics, and behaviour).
- Increased density of human population (e.g., due to population growth).
- Poverty and social inequality (e.g., tuberculosis is primarily a problem in low-income areas).
- Stress from farmland expansion on the environment (e.g., due to changing and expanding vector habitats).
- Globalization of food market and manufacturing (international travel and commerce).
- Environmental contamination (e.g., due to land use, technology, and industry).
- Climate change (warmer temperatures may allow mosquitoes to expand to new regions).

- Intentional biological attacks - Bioterrorism (e.g., 2001 Anthrax attacks).
- Drug resistance (contributes to the re-emergence of bacteria, viruses, and other microorganisms that change over time).
- Spread in healthcare facilities.

Spread of Emerging Infectious Diseases

In humans, infections occur when an infectious microorganism enters the body (directly or indirectly), multiplies, and leads to a reaction in the body and potential infectious diseases (Deventer & Hochberg, 2017). According to the U.S. Department of Health and Human Services (2020), the spread of emerging infectious diseases requires three variables, known as the 'epidemiological triad.' These variables include:

- The Agent - The microorganism that causes the infection can be bacteria, viruses, parasites, or fungi.
- The Host - The target of the disease.
- The Environment - The surroundings and conditions (these are external to the host).

Roles of Educational Institutions in Controlling Emerging Infectious Diseases in School

Infection control and prevention is a global issue, and many protocols and guidelines can be followed to minimize the spread of infection among people within a population and globally (Center for Disease Control and Prevention, 2020). Identifying at-risk groups such as children, older people, and those with chronic conditions can also help guide relevant strategies to protect these vulnerable groups. According to the CDC (2020), the first step when looking at infection control can start at the institution/community level by changing behaviour, including:

- Regular hand washing: Hand washing is essential to preventing infectious diseases. It reduces the number of microorganisms on hands that can spread infectious diseases. Use soap, warm water, and disposable paper towels.
- Appropriate use of face masks (protects from and prevents the spread of respiratory infections).

- Open the window to let the fresh air in Well-ventilated rooms help reduce the number of airborne germs inside. Respiratory diseases easily spread from coughs and sneezes. Opening the window at least once daily lets the germs out and fresh air in.
- Using insect repellents.
- Ensuring up-to-date routine vaccinations and participating in immunization programmes.
- Taking prescribed medications, such as antibiotics, as directed by health professionals.
- Social distancing - avoiding contact with others.
- Exclude sick children and staff. Sending a sick child home helps prevent the other students from becoming ill with an infectious disease. Staff should also stay home when they are sick.
- Do not share personal items among children, and keep their belongings separate. Do not allow children to share belongings such as hair brushes, food, clothing, hats, or other items.
- Using condoms when having sex, especially with a new partner.

Other steps that can be taken to control the spread within educational institutions/communities include health literacy and school health programme, as well as environmental measures such as modifying environments, surveillance of diseases, food safety, and air quality (World Health Organization, 2016).

Health Literacy: Health literacy is significant in improving the prevention and control of infectious diseases, whereas health knowledge and behaviour are essential components of health literacy (Allegranzi et al. 2017). Given the high incidence of infectious diseases among primary, secondary, and postsecondary students, improving students' health literacy on emerging infectious diseases is essential in controlling epidemics and outbreaks of infectious diseases in educational institutions (Dalibor & Slobodan, 2016). Health education can improve students' knowledge of emerging infectious diseases and promote the development of appropriate behaviours toward disease prevention and control. Health promotion is based on health education founded on health knowledge. Health education effectively slows the spread of infectious diseases, and conducting school health education programs not only provides students with proper knowledge and behaviour toward infectious diseases but also benefits the comprehensive development of educational

institutions (Wang et al., 2018; Adeola & Eze, 2021). Therefore, health education should be strengthened to improve students' health literacy.

School Health Programme: School health programmes are said to be one of the most efficient strategies that a nation might use to prevent significant health and social problems (Wang et al., 2018). Next to the family, educational institutions are the major avenues for providing the instruction and experiences that prepare young people for their roles as healthy, productive adults. Educational institutions can – and invariably do – play a decisive role in influencing students' health-related behaviours. Appropriate institutional interventions can foster effective education, prevent destructive behaviour, and promote enduring health practices (Dalibor & Slobodan, 2016). For many young people in their formative years, the educational setting may be the only nurturing and supportive place where they learn health information and have positive behaviour consistently reinforced. Although reliable data on the implementation of school health programmes are lacking, there are indications that few educational institutions operate comprehensive, coordinated programmes designed to systematically address the nation's significant health risks. School health programmes were initiated early in the twentieth century, in large part to address the numerous infectious diseases afflicting children (Wang et al., 2018).

Essential Elements of an Educational Institution Health Programme

An educational institution's health programme should be locally tailored to meet each institution's needs, resources, perspectives, and standards. Virginia School Health Guidelines (2022) indicated that while there is no one universally accepted definition and model of an educational institution health programme, the following essential elements should be considered in designing an institution health programme:

- **Services:** The services include health support, such as first aid and medication, tailored to the community's needs, along with assistance for students with disabilities. Counseling and psychological services focus on academic success and mental health. Nutrition services provide healthy meals, education, and a supportive environment.

- **Education:** This includes health education (which addresses the physical, mental, emotional, and social dimensions of health), physical education (which teaches the knowledge and skills necessary for lifelong physical fitness), and other curricular areas

(which promote healthful behaviour and an awareness of health issues as part of their core instruction).

- **School Environment:** This includes the physical environment (involving proper building design, lighting, ventilation, safety, cleanliness, freedom from environmental hazards that foster infection and handicaps, safe transportation policies, and having emergency plans in place), the policy and administrative environment (consisting of policies to promote health and reduce stress), and health promotion for staff (in order that staff members can become positive role models and increase their commitment to student health) (Virginia School Health Guidelines, 2022).

- **Community Participation:** This includes parent and community involvement (which consists of a wide range of community stakeholders — parents, students, educators, health and social service personnel, insurers, and business and political leaders—to develop and form the structure of the educational institution health program tailored to meet each institution/local community's needs, resources, perspectives, and standards) (Virginia School Health Guidelines, 2022).

Conclusion

Knowledge and behaviours are crucial elements that ensure student health and safety. Health education can change unhealthy attitudes and behaviours and effectively slows the spread of infectious diseases and epidemics, and conducting educational institution health education programmes provide students with proper knowledge and behaviour toward infectious diseases and benefit the comprehensive development of educational institutions. A comprehensive, well-coordinated institutional health programme can promote students' knowledge of preventing emerging infectious diseases and their overall health quality.

Suggestions

On the basis of the literature reviewed, it is suggested that Nigerian educational institutions should undertake:

1. Health education programme on emerging infectious diseases: Intervention programmes that promote health education of major infectious diseases help students to consciously

adopt healthy behaviours and lifestyles, eliminating or mitigating risk factors that influence the spread of infectious diseases, promoting health, and improving quality of life.

2. Health promotion for staff: Educational institutions should provide opportunities for staff members to improve their health status through health assessments, education, and fitness activities. These opportunities encourage staff members to pursue a healthy lifestyle that contributes to their improved health status, morale, and a more significant personal commitment to student's health, and they create positive role modeling.
3. School health promotion activities: Age-appropriate health promotion activities should be implemented at all educational institutions in the country to influence behaviour and enhance skills.
4. Proactive response plan: A response plan for healthcare and environmental services staff should be in place for infection prevention and control. Also, cases must be reported immediately to the local public health department. In addition, best practices for self-care should be implemented to include adherence to vaccination recommendations.

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