**Epidemiology Assessment Questions**

**Question One**

The Ministry of Health NZ (2018) defines measles as a highly contagious yet easily preventable infection. In the study by Reynolds et al. (2015), the authors explained that prior to the 1969 introduction of the measles vaccine in New Zealand, between 95% and 98% of children were infected by measles by age 18 years. The authors explain that the burden of measles and the complications attached to it continue to manifest through morbidity and mortality, despite the 46 years of effective vaccination. In this response, the prevalence of measles is discussed with particular focus on Auckland health district, New Zealand.

**Size of the problem**

In 2017, the WHO reported that New Zealand had successfully eliminated endemic measles. However, the study by Hayman et al. (2017) reports that New Zealand continues to suffer measles outbreaks. Between 2007 and June 2014, there were 1,137 cases of measles reported in New Zealand. In a report released by the Ministry of Health NZ (2018), it was established that New Zealand reported 101 cases of measles. This report indicated the prevalence of the cases based on the information provided by the District Health Boards. Majority of the cases (56) were reported from the Waikato health district, with Mid Central reporting 21 cases. Northland and Counties Manukau each reported six cases of measles in 2016, while Capital & Coast reported five cases. Nelson Marlborough has three reported measles cases while Auckland had two cases. Several district health boards did not record any case of measles, according to the report.

**Severity of the problem**

Measles has been found to cause serious complications for people of all age groups. However, the Auckland Regional Public Health Service (2018) documents that the one in three people diagnosed with measles experience diarrhea, ear infections, pneumonia, bronchitis and croup. In addition, malnourished children with Vitamin A deficiencies are at risk of blindness when infected with measles. Although rare, there are serious complications that accrue from measles. These complications include Sub-acute Sclerosing Panencephalitis (SSPE) and acute encephalitis (inflammation of the brain).

**Groups in the population affected**

The study by Hayman et al. (2017) indicated that age is a positive risks factor for measles infection, while race and ethnic backgrounds heighten the risk of the infections. Measles is highly infectious among children aged below 18 years. In 2016, children aged below 18 years reported over 80 cases of the total 101 measles cases in New Zealand (Ministry of Health NZ, 2018). Besides, this age group had the highest number of measles hospitalizations. People of European ethnicity are at high risk of measles infection compared to other sections of the population. Pacific Islander children aged below two years are also at risk of measles. People in social places, most likely in schools, are at high risk of measles.

**Treatment or preventive measures**

The Measles, Mumps and Rubella (MMR) vaccine is the best preventive method against measles (Ministry of Health NZ, 2018). In New Zealand, the MMR vaccine is provided free. The dose, which is often administered twice, provides immunity against measles by up to 99%. The Auckland Regional Public Health Service (2018) indicates that most of the measles outbreaks are attributed to overseas travels. As a preventive measure, individuals are advised to confirm their immunization status prior to leaving.

**Opportunity cost of measles intervention**

The most commonly used intervention strategy against measles is vaccination for all infants. The vaccination is provided freely across all the New Zealand district health boards. Inasmuch the vaccination dose substantially reduces the risk of the disease, the failure to vaccinate exposes the population to the risk of susceptibility, as the disease is highly contagious. In Auckland, the recent outbreak reported over 400 cases (Auckland Regional Public Health Service, 2018). Such outbreaks lead to hospitalizations, which increase the disease burden.

**Question Two**

The identified cases could be classified as an outbreak. Outbreaks refer to the sudden occurrence of a disease in a community. Additionally, outbreaks refer to infection severity that has never been experienced before. Outbreaks often occur within target communities, unlike epidemics, which is the occurrence of a group of illness of similar nature derived, mostly linked to one source. These cases are an outbreak because they affect a particular community, which constitutes children and young people neighboring schools. Besides, the case illustrates that there were no mass events reported in the area.

**Question Three**

Measles is identified as a highly infectious virus that easily spreads among people. Measles is highly contagious to an extent that it is 90% likely to affect individuals who are not immunized when they come into contact with people infected by the disease. There are several methods though which measles spread, including sneezing, coughing and breathing. In addition, when an individual comes into contact with throat or nose mucus, the measles infection is spread. In their study, Bond, Martin-Gall, Franklin and Sutton (2016) quoted the Center for Disease Control and Prevention module on measles, which explained that measles virus lives up to two hours in the an airspace in which the infected person has sneezed or coughed. Therefore, when other people breathe the contaminated air or touch the contaminated surfaces before touching their mouths, noses or eyes, they are infected.

Infected people are often the main carriers who spread measles to others. Measles is a disease that affects humans only, thus the measles virus cannot be spread by any other animal species. Once a person is infected with measles, they become infectious five days before and five days after the measles rash appears. Therefore, it is a common practice to isolate people with measles from the time that they are diagnosed with the illness until after the rash has appeared, normally five days after.

**Question Four**

In order to enhance the response capacity to the measles outbreak, it is imperative to facilitate an effective coordination of response activities that envisages timely information flow, inter-professional collaboration and development of a response team at the appropriate level. To identify the case of a potential outbreak, the process could begin by seeking clarification from the Auckland District Health Board on the confirmed cases of measles in the area and the particular settings in which the cases were reported.

The process of investigating the outbreak begins by identifying the factors that cause measles and the methods through which it is transmitted. Measles is an infectious diseases caused by a virus called paramyxovirus (Vaidya, Raut and Jadhav, 2016). The measles virus is transmitted as tiny droplets when a person is exposed to air close to an infected person. To determine the existence of this outbreak, mucus samples from the infected people should be subjected to laboratory testing to ascertain the infection. Thereafter, the sample should be tested for measles vaccination to ascertain the scope of the infection within the target community.

During the outbreak, laboratory confirmation should be sought for the initial five or ten cases in the particular district, in this case Auckland. Once the specimens have been collected for antibody detection, the virus characterization should be ascertained through obtaining the specimens that allow identification of the involved strain and its origin. Once the specimens have detected the existence of measles, the subsequent cases are primarily confirmed based on the epidemiological linkage to the cases confirmed from the laboratory. Following the laboratory confirmation of the initial measles cases, emphasis should be directed towards epidemiological investigation that is aimed at confirming the risk of new cases based on the linkage on the epidemiology of the particular case.

After the measles outbreak has been identified, the treatment process begins. The first step in administering treatment is to minimize the transmission of the virus. Upon identification, the suspected cases should immediately be subjected to isolation until after the measles is ruled out by laboratory or for five days after the rash inset for measles. According to Vaidya, Raut and Jadhav (2016), there are no prescription medications for treating measles because the symptoms often disappear within three weeks of their manifestation. However, there are symptoms that may cause significant discomfort on the part of the patient, including muscle aches and fever. To relieve the fever and the muscle aches, such medication as acetaminophen, naproxen and ibuprofen are administered. The prevention measures against the spread of measles should stretch beyond isolation after the outbreak to include measure such as immunization.

The eminent threat of future measles outbreaks can be minimized through embarking on a campaign to ensure that all the at-risk populations acquire immunization. For instance, the Auckland District Health Board could initiate a campaign to eradicate measles from the region through providing door-to-door immunization for infants and initiating educational programs in schools to encourage the confirmation of the immunization status of each individual.

**Question Five**

According to Crosby (2012), surveillance can be active or passive depending on the data collection methods. In this case, the passive surveillance system would be insufficient. In this system, health practitioners receive notifications of the requirements and they report these events based on the information that comes to their attention. The main reason why this surveillance system is insufficient is the vulnerability of incompleteness that it presents. There might be many cases of measles that have gone unreported within the target population areas. Additionally, there are threats to validity and reliability that are linked with this surveillance system. For example, the reporting definitions may not be adhered to, thus leading to variability in the report by physicians.

**Question Six**

Disease prevention plays an integral role in healthcare. Bond, Martin-Gall, Franklin and Sutton (2016) identified three main categories of disease prevention, including primary, secondary and tertiary. These prevention levels envisage the plans and measures taken to prevent the onset of a disease. Immunization is a primary level of prevention. This is a preventive measure taken before the disease begins. For measles, this prevention mechanism is conducted during infancy, when a child is aged 15-19 months.

**Question Seven**

In developing health policies to prevent against disease, it is imperative to make choices on the most appropriate strategy based on the risk at hand (Conway and Green, 2013). There are a range of questions that must be answered to determine the best alternative for the prevention strategy. For instance, the policy must consider whether the intervention can achieve overall health gains for the entire population while offering little advantages for each individual. Such considerations are the primary platforms upon which the “High Risk Individual” and “Population” strategies for disease prevention were introduced.

The population strategy, also referred to as the mass strategy, focuses on the whole population (Kawachi and Colditz, 2014). The purpose of this strategy is to reduce the risk factors of the population. In many instances, this strategy is used for widespread diseases. On the other hand, the high-risk individual strategy focuses on samples within the entire population that are considered to be more vulnerable to contract a disease (Kawachi and Colditz, 2014). For instance, the population strategy could be used in administering MMR vaccination to the entire infant population of Auckland. On the other hand, the high-risk individual strategy could be used in screening European individuals for immunization against measles, as they have reported the highest cases of measles in New Zealand.

**Question Eight**

The primary concern of public health is to improve the health of the populations. In determining the most appropriate strategy for preventing the occurrence of measles, Kawachi and Colditz (2014) asserted the significance of balancing between the high-risk individual strategy and the population based strategy. While discussing the differences between the population based strategy and the high-risk individual strategy, the authors concluded that the former is easier to implement. As Ihara (2009) explains, measles is a contagious disease that can be contained through vaccination during infancy. The author contends that the people who are not immunized against measles have a 90% chance of being infected by the virus. The population based strategy is the most appropriate preventive strategy that can be used to manage the occurrence of the disease.

In the Auckland District Health Board, there are several measures that could be used as population based strategies for reducing the occurrence of measles. These include legislation, public education and media-based strategies. The Auckland District Health Board can change the laws relating to the immunization against measles. For instance, a law should be created to mandate the obligatory MMR vaccination for all children born in Auckland before they attain two years. Besides, a law should be created to screen all children joining schools of measles, and subsequent health reports provided to ensure that each child is vaccinated. Additionally through legislation, laws can be implemented to mandate individuals to be screened for measles prior to leaving Auckland for overseas, as well as incoming individual from overseas. Such legislative changes could reduce the occurrence of preventable measles within the local community.

Public education is another formidable population based strategy that can be implemented in the Auckland to increase the immunization rates. Conway and Green (2013) identified public education as the most successful method of sensitization among the public on the need to consider certain health policies. Virtually all schools in Auckland should provide education on measles and the role that immunization plays in minimizing the prevalence of the infection. Additionally, the local district health board should work with individuals in different social locations to eliminate information inadequacy among parents and societal members on the significance of measles immunization.

Media-based strategies are population based methods in which the government funds campaigns and mass advertisements that encourage families and individuals to acquire the measles vaccination. In Auckland, the district health board can initiate a media campaign to encourage parents to present their infants to local health stations for the MMR vaccine. Such campaigns should include quotation on what it costs to acquire the vaccination, and the long-term effects that accrue for individuals who are not immunized.

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