Epidemiology: identifying the potential spread of infections assignment

Describe how epidemiology can be used to identify the potential spread of infections Awareness on infectious disease has been given importance for a very long time, even well before human kind had knowledge of micro-organism and its habitat. Related procedures, such as isolation were recognised and have been proved to be safe and good methods in reducing the spread of infectious disease. The concept of epidemiology was first recognised at the time of Hippocrates but its base originated late in 19th century from investigations of outbreaks of infectious disease such as plague, cholera and smallpox (Stolley, 1994).

John Snow contributed in building a formal concept of epidemiology, based on his investigations which had emerged from a range of theories which nowadays are being used by modern epidemiologists (MacMahon&Trichopoulos, 1996). Happily, these investigations have raised awareness among the population and authorities for developing and improving certain standards in social conditions, which can lead to a reduction in disease incidence (Valanis, 1999) Although epidemiological studies have made a relevant contribution to public health in the last decades, many people do not know what epidemiology is and how it contributes to our society.

This remains an issue, which affects the lives of most of the people. Epidemiology is defined as a “ branch of medical science that deals with the incidence, distribution, and control of a disease in a population” (Merriam-Webster Dictionary, 2007). Epidemiology is a discipline, which relies mostly on quantitative studies (Valarnis, 1999) focussed in measuring the disease from onset to resolution and analyzing the pattern of occurrence in

individuals or groups including any deviations/ causes which can bring about an alteration of health.

There are many organisations worldwide, which monitor and investigate disease outbreaks. In England and Wales, the Health Protection Agency Centre for Infections monitors such outbreaks and its function is “ to protect the community (or any part of the community) against infectious disease and other dangers to health (HPA Act, 2004). The progress made in understanding the link between the micro-organism and human disease pushed the epidemiologists to focus mostly on promoting and improving the health of the population and in controlling infectious diseases (Wilson, 2008).

Epidemiologists therefore are often called to investigate clusters of disease in specific geographical areas, where an outbreak has occurred. Such an example is E. Coli o104 outbreak all over Europe which occurred at the beginning of May 2011. There was a dispute with regard to the source and the transmission of the infection and which lead to several political arguments. The Health Protection Agency and European Centre for Disease Prevention and Control investigated the source and cause of the spread of the bacteria.

This type of outbreak was uncommon for European authorities since the bacteria was of a rare strain, but the findings of the HPA and ECDPD has provided sufficient information to the population regarding the risks and involved the necessary actions to be taken to prevent spread of the infections. Examination of the pattern of this infectious disease has identified unusual characteristics, the type of the population affected (mostly adults

and very rarely children or elderly), and demographic factors which were important to show the exposure to risk of illness (HPA, 2011).

The observations recorded from the description of the disease can provide measures of the disease frequency, which were helpful in estimating the number of people affected and to what extent the disease, could spread (Valanis, 1999). The data is analysed and validated through a system records and then compared to other similar outbreaks(Beaglehole, 1993). The constant surveillance is an ongoing system used to monitor the changes in the trend of the distribution of the infectious disease, the type of the strain and its virulence. For example, studies of E. Coli outbreaks showed an increase, in the last decade of a particular pathogenesis of E.

Coli bacteraemia. Laboratories have detected virulent strains E. Coli and especially the last one discovered E. Coli O104 which had caused a higher level of illness (HPA. It was confirmed that main transmission of the infectious disease came through a food source. Therefore, Public Health organisations have given strong recommendations to the population in following standard hygiene food control. Centres like HPA continuously monitor the frequency and distribution of the disease by centralising all reports about communicable diseases. They anticipate and detect the underlying factors which may lead to an outbreak (measles, H1N1, avian flu).

One of the most important purposes of the surveillance is to detect the early identification of an outbreak by being notified the communicable-disease , which by law must be reported by the healthcare professionals to the proper authorities . Their diagnosis must be based on an evaluation of the

symptoms rather than waiting for laboratory results. Laboratory reports identify what type of organism is involved and the level of its virulence. Clinicians and epidemiologists have to work hand to hand although their responsibilities differ when they encounter such infectious diseases.

Clinician give more attention to the patient, focussing mainly on treating the illness, while the epidemiologists' targets is to find the source that caused the disease, the number of persons exposed , and potential carriers of the disease in the community. Therefore, all centralised information is analysed and used at both local and national level to suggest potential actions to be taken such as the identity and control of the source (e. g. outbreaks of food poisoning). This is necessary so that health services are prepared to deal with the increased number of patients (e. g. nnual flu epidemics) by supervising and monitoring the effectiveness of immunisation programmes , and by looking out for any changes in the frequency of the disease, An example of trying to prevent spreading of infectious diseases could be by working on the efficacy and safety of the use of the vaccines or developing new national screening such as programme for detecting Human Papilloma Virus, Chlamydia infection in women, HIV etc. These activities can lead to a change in vaccination policy or introduction of new screening tests virulence. Discuss how immunisation programmes protect society from epidemics.

The frequent outbreaks, of the most debilitating and fatal infectious diseases which occurred in the last two centuries gave epidemiologists a strong determination to develop effective treatments in order to control, prevent and if possible eradicate many of the infectious diseases (Wilson, 2002).

There are marked efforts in the developed world not only to create

programmes for better sanitation, cleaner drinking water, improvement in social conditions etc, but also to develop immunisation programmes which have contributed considerably to the greatest public health success (Connolly, 2011).

The incidence of many infectious diseases has been significantly reduced worldwide as a result of vaccinations. Vaccines which were first made use of in the 11th century are considered the most effective medical intervention, which succeeded to prevent and eventually led to the elimination of some infectious diseases such as smallpox, polio etc(Ulmer, 2002). Immunisation programmes at national level are currently set up by health departments. These routinely offer a wide range of vaccines.

The primary aim of vaccination is to protect each individual by" inducing a specific level of immune response against a micro-organism without causing the actual disease" (Wilson, 2006, page 76). However, each individual has built his own immunity, which may be innate or acquired. Innate immunity is that which one is born with and it is specific to each individual. Acquired immunity is gained after birth through a number of different ways. (Blackwell & Wheir). There are two types of acquired immunity:) Passive acquired immunity: -Natural ??? received by the foetus in uterus or by an infant from maternal colostrum -Artificial-when a person receives antibodies in antisera or gamma globulin 2) Active acquired immunity: – Natural occurs when the person's body responds to the entry of a live pathogen – Artificial-acquired in response to vaccines (Burton & Engelkirk, 2007) A vaccine is defined as a material produced artificially from killed microorganisms or their products.

The primary aim is to protect the individual who receives the vaccine by being exposed deliberately to killed or attenuated strains of microorganism and by stimulating the cell of the immune system and creating antibodies (Burton &Engelkirk, 2007). The effectiveness of vaccines depends mostly on the material that they are made from (Burton&Engelkirk, 2007). It is believed that vaccines made from live organisms are more effective because the organism which is multiplying within the body produces a higher level of antibodies.

Although there is a certain risk for the person to contact the disease, once the vaccines are inoculated into a person the immune system is stimulated more efficiently and produces antibodies or memory cells. These remain within the body to recognise each specific organism and therefore acquired immunity to the disease (Wilson, 2006). There are well-established immunisation programmes recommended by Centres for Disease Control and Prevention (CDC) worldwide (King, 2009). Vaccines are administered to children from birth to entry in school and they must be completed up to age of 19 years.

Immunisation is very important also for adults eg. tetanus boosters, flu vaccines that are given seasonally and pneumococcal pneumonia vaccine given to elderly and high-risk patients. Around the world, the effectiveness of immunisation programmes has varied. This has depended mostly on primary healthcare services responsible for its implementation (Wilson, 2006) and on the perception of the immunisation concept by the community. The aim is to protect a wider community through the principle of herd immunity.

This can be achieved by maintaining a high level of coverage of vaccinations in a percentage of 95% in order to create resistance to invasion or spread of an infection. Herd immunity is based on a principle that the more contagious the disease the higher the number of people that need to be vaccinated (DoH-Washington). In spite of the well-known benefits of the vaccination, significant ethical issues have been raised in developed countries (King, 2009). There are statements, which argue that there are risks associated with vaccination eg. disorders such as autism, chronic fatigue, Crohn’s Disease.

These suggest that vaccination is not needed as long as the occurrence of certain diseases is rare, and therefore the population is no longer threatened (Connolly, 2011). Consequently, there is the risk of complacency among the population about immunisation and more parents are protecting their children from the potential harm of the vaccines. This possible misconception has led to a drastic drop in the number of children vaccinated against measles, mumps and rubella. This decline has challenged public health services to find the best way to serve simultaneously the interests of the individual and of the community (King, 1999).

If we look at the experiences lived back in time when diseases like smallpox and polio caused so many victims it can be ascertained that the benefits of vaccination outweigh the risks. Despite of the contribution to the global public health (Grady, 2004) and medical evidences, vaccines are not fully appreciated (Ulmer and Liu, 2002). Therefore, there is the need to be reinforced a new strategy of immunisation programmes in primary care system to ensure that each individual is informed about the benefits and

risks of vaccination. http://www. imt. ie/clinical/2011/03/no-room-for-complacency. html