

Epidemic of measles in Serbia

Siniša Franjić*

Faculty of Law, International University of Brcko District, Brcko, Bosnia and Herzegovina

Abstract

Vaccination is the most successful and cheapest public health prevention method for infectious diseases. Vaccination of children is done on the basis of Calendar of Vaccination and vaccination of adults is done according to their requirements. Vaccination of children is free but necessarily. Unfortunately, some parents do not allow the vaccination of their children, and as a fundamental reason for such a decision is negative health consequences for children. Some parents do not realize that such a decision endangers the health of their children. Evidence of this is the appearance of a measles epidemic in Serbia at the beginning of 2018, but it should be said that they did not only affected children because affected also adults. According to official data of the Institute of Public Health of Serbia "Dr. Milan Jovanović Batut" from March 26th, 2018, the current epidemiological situation say that 4156 persons were affected by the measles, the youngest is 15 days old baby and the oldest 70 years. It is of particular concern that 95% of patients are not vaccinated or partially vaccinated. As a consequence, 11 people died. These numbers speak very much for themselves.

Introduction

Vaccination is one of the most effective methods in the prevention of infectious diseases, the last century public health project which accounts for the prevention of 2 to 3 million deaths in children each year worldwide [1]. Despite the fact that vaccination is mandatory in a great number of countries and the evident epidemiological data that indicate the effectiveness of vaccination which is reflected in the significantly lower incidence of preventable childhood infectious diseases (eradication of smallpox, eradication of polio in the most countries of the world), there is an increasing number of parents who refuse to vaccinate their child, which results in increased number of unvaccinated children and occurrence of greater or smaller epidemics of preventable childhood diseases. The reason for an increased number of unvaccinated children could be explained by the parents' fear of vaccine side effects and by doubts in the effectiveness of vaccination, the inadequate communication with health care workers and wish to receive information from anti-vaccination movements. Parents could receive the information from different sources: public health employers, family members, friends, media, blogs, different Internet sources, and Internet social network, different interest groups and anti-vaccine movements. According to recent resources, the physicians are still the most preferable source of information from whom the parents want to receive the information about the vaccination. Therefore, the duty of physicians is to know the possible models of communication in order to provide the qualitative information regarding the vaccination.

Vaccination has become a part of our lives [2]. It begins already in the maternity ward, continues through childhood and adolescence and finishes around the age of twenty, providing us with valuable protection from then on. However, vaccination is also a useful and important prophylactic measure in the elderly, who belong to a vulnerable age group due to biological features and, sometimes, life circumstances. Elderly patients, just like children, are more prone to some infectious diseases or have more problems in fighting them. This can be accompanied with compromised immunity to diseases with the already acquired immunity.

Briefly about the measles

Measles are a highly contagious viral disease characterized by rash, cough, leaking from the nose, eye irritation and high body temperature. They usually occur in late winter and early spring, and are transmitted by direct contact with the affected person. The virus is easily transmitted from man to man, meaning that almost all people who have been in contact with the disease will be infected if they have not been vaccinated and if the measles have not survived.

Measles is a global disease but may have been absent from the Americas prior to contact with Europeans [3]. Measles, in combination with smallpox, likely was responsible for large numbers of deaths of Native Americans, facilitating European conquest. Progress in measles elimination efforts has resulted in the interruption of measles virus transmission in large geographic regions, including the Americas. Because of its mode of transmission and high infectivity, this virus is most readily maintained in densely populated urban settings. Migration of infected persons to rural areas results in outbreaks in susceptible rural populations too small to maintain measles virus transmission. An extreme example occurs in isolated island populations where periodic introduction of measles virus results in widespread but self-limiting outbreaks.

Measles is a miserable and very infectious viral illness, characterized by its distinctive rash and the three 'C's'-cough, coryza and conjunctivitis. After an incubation period of 10–14 days there is a prodrome, when Koplick spots appear on the buccal mucosa of the cheeks, looking like grains of salt on a red background, and fever and upper respiratory symptoms develop [4]. The child is ill and irritable.

Correspondence to: Siniša Franjić, Faculty of Law, International University of Brcko District, Brcko, Bosnia and Herzegovina, Tel: +385-31-51-28-00; Email: sinisa.franjic@gmail.com

Key words: Measles, Vaccination, Public health

Received: April 02, 2018; **Accepted:** April 05, 2018; **Published:** April 09, 2018

The rash begins on the third or fourth day on the face and behind the ears, and spreads downwards to cover the whole body, beginning to fade after 3-4 days and becomes blotchy. The child is contagious prior to the onset of the rash on the fifth day. Treatment of measles is supportive. Acute otitis media and bronchopneumonia are common complications and require antibiotics. In developing countries there is a high morbidity and mortality, and diarrhoea is also common.

The serious complication of encephalitis occurs rarely, causing drowsiness, vomiting, headache and convulsions. Subacute sclerosing encephalitis (SSPE) is a rare complication which occurs 4-10 years after an attack and is characterized by slow progressive neurological degeneration. High levels of measles antibody are found in the blood and CSF, and the virus antigen has been demonstrated in brain tissue. Immunization with live attenuated vaccine is at age 12-18 months.

Important facts about the measles

Assessing an individual's susceptibility to measles depends on various factors [5]:

- Date of birth/age: due to changes in measles epidemiology overtime and introduction of measles vaccination.
- Past history of infection: natural infection confers lifelong protection.
- The individual's vaccination history: a single dose of measles-containing vaccine is known to be at least 90–95% effective in protecting against clinical measles. A second dose gives protection to almost all who were unprotected after the first dose.
- Maternal history of infection/vaccination for an infant: a full-term infant under three months will have passive immunity from its mother if she has had measles infection. Passive protection from maternal vaccination, however, cannot be guaranteed.
- Past medical history: individuals who are immunosuppressed may still be at risk despite previous immunization or natural infection.

People must know that there is a need to act quickly and prioritize the most important public health actions—MMR prophylactic vaccination within 72 hours, and HNIG as soon as possible, and no later than six days after exposure, to susceptible individuals deemed at high risk following exposure to measles.

Vaccination

Vaccines are materials which when introduced into the human body help protect the vaccinated person against specified communicable diseases [6]. Communicable diseases are diseases caused by microorganisms, including viruses. Vaccines are preparations of dead or weakened pathogens, or their products, that when introduced into the body, stimulate the production of protective antibodies or T cells without causing the disease.

Vaccine is the most effective way of preventing measles, and has been shown to be one of the most cost-effective public health interventions available [7]. Current measles vaccines use live, attenuated measles virus. They are generally contraindicated in immune-deficient children.

Vaccines are also special in linking the most global with the most local and personal [8]. Aiming to reach every child on the planet, vaccination technology has a uniquely global character. Vaccines are produced, distributed and monitored within systems that are equally globalized. Yet vaccination reaches from the global into the most intimate world of parenting and care. At the needle point, the most global meets the most personal of worlds. As a technology, it enters

the intense social world in which parents and carers seek to help their children flourish, spanning genders and generations, comrades and communities, and advice givers. These are everyday worlds that vary enormously across the globe, and over time. Within them, some jostle for vaccination. Others jostle against. Through thinking and talking about vaccination, people often express a great deal about what they value, who they are and whom they identify with.

Various attitudes about vaccination

Access to and the quality of medical care can be a determinant of disease [9]. When a high percentage of individuals are protected by vaccination, nonvaccinated individuals in the population may be protected as well. Cigarette smoking cessation efforts may help smokers to quit, and treatment of infectious disease may reduce the spread to others. Medical care, however, often has its major impact on the course of disease by attempting to prevent or minimize the disability and death once disease develops.

Parents view themselves as best able to decide whether consent to a vaccine is warranted because they most intimately know their own children, understand their unique health statuses and vulnerabilities, and believe that they can most accurately estimate risk [10]. They also engage in a process of empowering themselves, usually through self-education, to make informed decisions, with information coming from books, websites, physicians or other health providers, peers, family members, advocacy organizations, or publications committed to natural living. Critically, mothers also weigh their information alongside what they often see as their trump card: a sense of intuition about what they feel their children need. The constellations of sources parents seek out, alongside their intuition, represent their intent to make good decisions for their children and become more credible than advice or recommendations provided by scientific advisory panels.

People must know that vaccines protect the organism from various diseases, but they need to know that there are negative side effects that rarely happen. Vaccination and immunization provide another good example of the tension between individual and public benefit [11]. A comprehensive vaccination programme is of unequivocal value to the community at large. For any one individual, however, while there is also benefit in terms of reduced susceptibility to disease, there is also a risk (albeit very small). In truth, therefore, the best situation from the individual's point of view is for everyone else to be vaccinated.

How epidemic appear

Evolution has fostered the development of defenses against infection [12]. The skin is an effective, if passive, barrier against most bacteria and viral infections. Surface responses that help resist infection include sweating and desquamation, cilia movement in the respiratory tract, and production of mucus along interior epithelial surfaces. Mucous membranes have antibacterial properties; stomach acid, saliva, and tears help to resist infection. In the gut, entrenched but friendly bacteria compete with pathogens, limiting opportunities for the pathogens to establish themselves. For pathogens that manage to penetrate skin or mucous membranes, the immune system provides two more levels of defense. The first comes from the innate immune system. Injury to cells triggers a nonspecific inflammatory reaction, which is a cascade of events involving chemical and cellular responses to the local injury. The inflammatory reaction recruits a variety of blood cells, including mast cells, phagocytes, neutrophils, and others that play various roles in the host response. The innate immune system also activates the adaptive immune system, which allows a specific response to infectious

agents. This system produces anti-bodies that are designed to attach to specific sites on the pathogen or its toxins, neutralizing the threat. Specialized B-cell lymphocytes work in conjunction with helper T cells to produce antibodies. These cells also record the antigenic pattern that stimulated their response, enabling a faster and more effective response if the antigen is encountered again. This antigenic memory is what is commonly referred to as immunity to an infectious agent. Immunity occurs naturally after an infection, but it can also be stimulated by vaccination, which is intended to provoke an immunogenic reaction without causing an initial pathogenic infection. Immunity can vary in duration from a relatively short period to lifetime protection.

The sophistication of host defenses implies that humans have always had to reckon with infectious disease. The balance between host and pathogen, however, is readily tipped by changing social conditions. For example, human invasions or migrations sometimes brought immunologically naïve populations into contact with diseases to which they had not previously been exposed. Urbanization during the Middle Ages brought on the conditions that fostered spread of the plague. Europeans brought with them to the New World a host of infections, such as smallpox, measles, typhus, and cholera, which had catastrophic consequences for natives of the Western Hemisphere.

Immune memory against the measles virus provides lifelong protection because the measles virus does not evolve widespread escape variants [13]. Measles can vary its dominant surface antigen, hemagglutinin, and limited variation does occur. So it is an interesting puzzle why antigenic variants do not spread as in many other viruses.

Perhaps the very high infectiousness of measles causes the common strain to spread so widely in the host population that little heterogeneity occurs among hosts in immune memory profiles. If memory responds against a few different epitopes, then no single-step mutational change allows a measles variant to spread between previously infected hosts. The only “nearby” susceptible class of hosts arises from the influx of naive newborns, which depends on the birthrate of the host population. Naive hosts do not impose selective pressure for antigenic change.

The task of epidemiology

Epidemiology is the study of the distribution and determinants of health-related states or events in human populations and the application of this study to the prevention and control of health problems [14]. Epidemiology is commonly referred to as the foundation of public health because it is a study that aids our understanding of the nature, extent, and cause of public health problems and provides important information for improving the health and social conditions of people. Epidemiology has a population focus in that epidemiologic investigations are concerned with the collective health of a group of individuals who share one or more observable personal or observational characteristic. Geographic, social, family (marriage, divorce), work and labor, and economic factors may characterize populations. In contrast, a clinician is concerned for the health of an individual. The clinician focuses on treating and caring for the patient, whereas the epidemiologist focuses on identifying the source or exposure of disease, disability or death, the number of persons exposed, and the potential for further spread. The clinician treats the patient based on scientific knowledge, experience, and clinical judgment, whereas the epidemiologist uses descriptive and analytical epidemiologic methods to provide information that will ultimately help determine the appropriate public health action to control and prevent the health problem.

The primary focus of the epidemiologist is not on the individual, but on the health problems of social aggregates or large groups of

people [15]. The epidemiologist studies both the origin and distribution of health problems in a population, through the collection of data from many different sources. The next step is the construction of a logical chain of inferences to explain the various factors in a society, or segment of that society, that cause a particular health problem to exist. Epidemiology is one of the most important investigative fields in the study of health and disease and is applied throughout the world to solve health problems.

Evidence-based medicine

Beginning with a historical account of the origins of EBM, a focus on three key methodological innovations employed by EBM will be used to advance the argument that EBM's original contribution to medicine, or what separates EBM from other approaches, is the priority it gives to certain forms of evidence, specifically evidence from randomized controlled trials [16]. EBM offers a shift in the sort of evidence that is most highly valued for diagnosis, therapy, and prognosis questions, as heavy emphasis is placed on experimental controls and quantified measures, thus diminishing the previous status of clinical experience and observational studies significantly. This commitment represents not only methodological change, but also a novel regard of the reliability of various forms of medical knowledge. EBM offers a new answer to medicine's fundamental normative question: how ought we to practice medicine?

Evidence-based medicine (EBM) has become a well-known and well-accepted concept in the past decade [17]. The concept that the best evidence can be used to make the best decisions for health has origins at least as far back as the mid-nineteenth century in Paris. At one point defined in the following terms: ‘evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients’, increasingly the term ‘evidence-based medicine’ is being used to encompass evidence-based health care and evidence-based health policy. Evidence-based health care and evidence-based health policy have implications wider than the direct clinical questions EBM seeks to answer concerning individual patients; they also seek to answer questions on the explicit and judicious use of current best evidence for populations.

Using an evidence base has intuitive benefits for both providers and recipients of health care. For providers, the concept that evidence can be used to determine the best way of providing health care is attractive: it can save money, prevent criticism and provide comfort that the approach is right. For recipients, the EBM approach suggests they are getting the best care, regardless of their capacity to assess the technical expertise of the provider.

Right to health

One of the fundamental human rights is the right to health. Human rights law, with its central tenet of the inherent and equal dignity of all people, is uniquely positioned to catalyze progress toward global health equity [18]. Human rights protections expressly afford everyone the right “to the enjoyment of the highest attainable standard of physical and mental health.” This and other socioeconomic rights extend from health care and public health to the social determinants of health, such as water, sanitation, nutrition, housing, education, and employment. Human rights promote civic engagement and political accountability, and can even transform power dynamics, stimulating governments to meet the health needs of even the most marginalized people.

Whilst newborn (up to twenty-eight days old) and infant (under the age of one) children are totally dependent upon others to interpret

and meet their needs, at a young age-four or five, perhaps younger-children will, to varying extents, contribute to maintenance of their health and well-being [19]. They will be able to take some responsibility for their daily care: for example, washing their hands and cleaning their teeth. Furthermore, young children can be participants in their healthcare: for example, reporting symptoms, taking medicine, sitting still whilst a wound is tended or immunisation administered by injection. By this age, children will be able to understand explanations given in appropriate language and manner and thus can be involved in decisions about their healthcare before they start school. Each child is different. The extent to which each child wants, and is able, to be actively involved in their healthcare will vary. Whilst we would not expect a child of this age to take responsibility, we can demonstrate respect for each child as an individual person by involving them, consulting them and considering their views on the benefits and harms of what is proposed. The extent to which each child can be involved is not only dependent upon the individual child but upon the appropriateness of the explanations given, the willingness of the caring adults to listen to the child and the circumstances in which such an exchange takes place. The responsibility of parents for the healthcare of their young and dependent child not only involves negotiations with healthcare workers but further involves negotiation with the child and, where the child is unable to express his or her views and feelings, careful consideration of their child's needs.

Vaccination brings potential benefit to the individual receiving the vaccination because they are less likely to develop that particular disease if they come into contact with it [20]. However, there is also an important benefit to society if sufficient members of that population are vaccinated to create herd protection. Herd protection means that all members of the community are at reduced risk of attack by infectious disease. This is because if such a disease enters the population it is far less likely to become an epidemic or pandemic as any diseased individual is unlikely to pass on the infection if the surrounding individuals have been vaccinated prior to contact. In addition, any unvaccinated individuals in the population are better protected, as they are less likely to come into contact with an infected individual. (At least some unvaccinated individuals are not at risk due to their own decisions. For example, neonates might not be old enough to be vaccinated; the ill and those with compromised immunity might be unvaccinated for sound medical reasons; vaccination might fail or be insufficient to give immunity; scheduled vaccinations might have been missed due to population movement, etc.) Herd protection offers all these groups their only vaccine-related protection against the risk of disease.

Conclusion

Vaccination is the most effective method of public health in preventing infectious diseases. Receiving a vaccine increases the immune system and increases resistance to infectious diseases.

Today's modern medicine, based on scientific evidence, has repeatedly proved that infectious diseases and methods of their prevention have been scrutinized in scientific studies. It has been scientifically proven that, despite the rare side effects that occur rarely, vaccination has no alternative and vaccination is the most effective method of preventing contagious diseases. Despite scientifically based evidence, there are parents who do not give their children any vaccine, and this is one of the reasons why epidemics appear. Parents sometimes find it difficult to accept the fact that vaccination protects their child from contagious diseases. Unfortunately, such decisions can have serious consequences.

References

1. Pelcic G (2016) Vaccination and communication. *Medicina Fluminensis* 52: 477-485.
2. Aleraj B (2005) Vaccination in the Elderly. *Medicus* 14: 291-293.
3. Moss WJ, Martin O (2014) Infectious disease epidemiology-theory and practice. (3rd edn.), Jones & Bartlett Learning, Burlington, pp. 492.
4. Miall L, Rudolf M, Levene M (2003) Paediatrics at a Glance. Blackwell Science, Malden, pp. 84.
5. Baxter D, Marsh G, Ghebrehewet S (2016) Health protection-principles and practice. Oxford University Press, Oxford, pp. 87.
6. Okafor N (2007) Modern industrial microbiology and biotechnology. Science Publishers, Enfield, pp. 472.
7. Isaacs D (2007) Evidence-based pediatric infectious diseases. BMJ Books, Blackwell Publishing, Malden, pp. 289.
8. Leach M, Fairhead J (2007) Vaccine anxieties-global science. Child health and society, Earthscan, London, pp. 2.
9. Riegelman R (2010) Public health 101-healthy people-healthy populations. Jones and Bartlett Publishers, Sudbury, pp. 12.
10. Reich JA (2016) Calling the shots-why parents reject vaccines. New York University Press, New York, pp. 70.
11. Wall A, Owen B (2005) Health policy. Taylor & Francis Group, London, pp. 153.
12. Rothman KJ (2012) Epidemiology-An introduction. Oxford University Press, Oxford, London, pp. 110-111.
13. Frank SA (2002) Immunology and evolution of infectious disease. Princeton University Press, Princeton, pp. 265.
14. Merrill RM (2017) Introduction to epidemiology. Jones & Bartlett Learning, Burlington, pp. 2.
15. Cockerham WC (2016) Medical sociology. Taylor & Francis Group, London, pp. 30.
16. Goldenberg MJ (2012) Innovating medical knowledge: understanding evidence-based medicine as a socio-medical phenomenon. InTech, pp. 12.
17. Plant AJ (2004) Evidence-based health care and international health: good, but not good enough. Taylor & Francis Group, Abingdon, New York, pp. 141.
18. Gostin LO (2014) Global Health Law. Harvard University Press, Cambridge, London, pp. 243.
19. Bridgeman J (2007) Parental responsibility: young children and healthcare law. Cambridge University Press, Cambridge, pp. 1-2.
20. Dawson A (2011) Public health ethics-key concepts and issues in policy and practice. Cambridge University Press, Cambridge, pp. 147.