VACCINATION – COLLECTIVE RESPONSIBILITY OR VIOLATION OF RIGHTS? (Abstract) Vaccination is considered to be the most effective and the cheapest medical intervention through which individual and collective immunisation is achieved. Statistics show that, at present, immunisation annually saves 400 million lives and protects approximately 750,000 children against disabilities of varying degrees. Approximately 80% of worldwide children are vaccinated against diphtheria, tetanus, pertussis, polio, measles, etc.; these diseases used to be considered incurable in the past. Vaccines help the body to produce antibodies; they help the immune system to detect germs and inactivate their cells. The immunological protection is installed after a variable period of time following the inoculation and is long lasting. Immunisations can be achieved in several ways: through national immunisation campaigns with general recommendation – they may be compulsory, optional or prophylactic (for the diseases for which a vaccine is available); vaccinations not included in the compulsory immunisation programmes; they may also be targeted to the contagious infectious outbreaks or to groups of population in certain situations. There is no guarantee that a vaccine will provide 100% protection. However, it will significantly reduce the risk of getting an infection. Vaccines have side effects which can be divided into reactions triggered by the vaccine or reactions exacerbated by it, without a causal relationship to the vaccine. Keywords: VACCINE, IMMUNISATION, BCG, VPI.
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Vaccination against smallpox compulsory for children aged up to 3 months. Later, in 1867, the law was changed and the vaccination against smallpox became compulsory for children under 14 years old. Over time, people have objected to vaccines in multiple ways. Firstly, they were bothered by the mandatory character of immunisations, as they considered it as a human rights violation (1, 2). The Leicester Demonstration March of 1885 defines the anti-vaccination movement of those years. Almost 100,000 people went out in the streets with banners and branded dolls of Edward Jenner. All these movements shortly led to the establishment of the first British commission to study the impact of vaccination on the public health. In 1896, the Commission concluded that the vaccine was effective against smallpox. At the same time, however, the same commission suggested removing sanctions for non-vaccination (2).

In 1905, the US Supreme Court ruled that states were entitled to coerce vaccination to protect its citizens in case of infectious diseases. It was the first decision of the Supreme Court related to the issue of public health. Today, in Belgium, parents who do not vaccinate their children against polio are fined and sentenced to up to five months in prison. In Australia, parents and GPs receive material rewards for vaccination. In the UK, material rewards are given to doctors only when they achieve the immunisation targets set by the government (2).

HISTORY

Vaccination is a means of prophylactic active immunisation against diseases by inoculating a biological formula with antigenic properties, which triggers the occurrence of an immune response in the body subject to vaccination. Immunological protection is installed after a variable period of time after inoculation (weeks, months), depending on the vaccine, and is active for a long period of time (years). Some vaccines are administered in maternity, while others are administered soon after birth. Using special techniques, harmful components that can trigger the disease mechanism are removed from the extremely complex structure of the virus, and only structures useful for stimulating the immune response are used (2).

Edward Jenner, the one who gave the name of “vaccine” to the immunisation process, noticed that patients who developed cowpox (an infectious disease specific to cows that is transmissible to humans and is characterised by cutaneous rash) were protected against smallpox. A cowpox epidemic outbreak on a farm in the spring of 1796 gave him the opportunity to experiment and to broaden his knowledge and research. In May 1796, he made an incision on an 8-year-old boy’s arm, where he applied pus collected from a pustule of a milkmaid infected with cowpox. A pustule appeared at the incision site, which healed shortly thereafter. In July 1796, Jenner voluntarily and consciously infected this boy with smallpox, but it turned out that the child was immune to the disease. This made the doctor repeat the procedure on 8 more children, including his son. In all cases, it turned out that patients had become immune to smallpox. Jenner gave the name of “vaccine” to the process, a word derived from the Latin “vaccina” – cow, and the method was going to expand rapidly in Europe and beyond (3).

IMPORTANCE

Polioymelitis

Vaccination is considered the most ef-
effective and the cheapest medical intervention, through which the individual and collective immunisation is achieved, which prevents the pathogen from spreading. Statistics show that, at present, immunisation annually saves 400 million lives and protects approximately 750,000 children against disabilities of varying degrees. Also, approximately 80% of worldwide children are vaccinated against diphtheria, tetanus, pertussis, polio, measles, etc.; these diseases used to be considered incurable in the past (2, 3).

Vaccines help the body produce antibodies; they help the immune system to detect germs and inactivate their cells. The immunological protection is installed after a variable period of time following the inoculation and is long lasting (years). Immunisations can be achieved in several ways: 1) through national immunisation campaigns with general recommendation – they may be compulsory, optional, prophylactic (for the diseases for which a vaccine is available); 2) optionally, for the prevention of diseases for which a vaccine is available – these vaccines are not included in the compulsory immunisation programmes; 3) they may also be targeted to specific contagious infectious outbreaks or to groups of population in certain situations (2, 4). There is no guarantee that a vaccine will provide 100% protection, but it can significantly reduce the risk of getting an infection. Over time, there have been people who were vaccinated but developed the infection that should have been prevented by the vaccine; yet, it is considered that immunisations used at present do not trigger the disease they are supposed to prevent. Vaccines have side effects which can be divided into reactions triggered by the vaccine, connected to the properties of the vaccine and to the individual response of the body, and which are unlikely to occur in the absence of the vaccine; on the other hand, there are reactions exacerbated by the vaccination, which are present in the absence of the vaccine, but which are enhanced by the vaccination or by manufacturing errors and which have no causal relationship to the vaccine (2, 5).

In Romania, vaccine production began in July 1921 when the government established by decree of King Ferdinand I the Serums and Vaccines Institute, the current Cantacuzino Institute. An important role was played by scientist Ioan Cantacuzino, who prepared the serum anti-dysenteric, the anti-cholera serum, the anti-tetanus serum, the anti-typhoid serum and other serums in the institution he founded and due to which, in our country, many extensive campaigns aiming to eradicate contagious diseases have been conducted. The specialists of the Institute have been in charge of diagnosis, research, public health and education ever since its establishment (2, 4).

The first outbreak was reported in Europe in the early 19th century and in the US in 1843. In the next 100 years there were polio epidemics recorded in the developed countries in the northern hemisphere every summer and autumn. They became increasingly serious and the average age of the people affected increased. Polio reached a very high threshold in the United States in 1952, with over 21,000 cases of paralysis. After the introduction of vaccines, the incidence of polio decreased abruptly. The last case of wild polio virus in the United States was recorded in 1979. In the next 10 years, polio was globally eradicated. A polio eradication programme conducted by the Pan American Health Organization managed to eliminate polio in the Western Hemisphere in 1991 (3, 6).
At a worldwide level, the effort of eradicating polio has taken significant steps since the launch of the Global Polio Eradication Initiative in 1988. At that time, about 350,000 children became paralyzed every year. In 2008, there were only 1,655 reported cases of confirmed polio in the world. In the last 25 years, the number of cases has been reduced by more than 97%; consequently, in 2013 there were 223 cases of polio, which was endemic in only three countries: Afghanistan, Nigeria and Pakistan. In 2013, there was another major epidemic with 174 victims in Somalia (5, 6, 7).

In Romania, there were several epidemic episodes: in 1927, 1955, 1980 – 1982 (221 cases caused by wild polio virus type 2 and 3), as well as between November 11, 1990 – April 25, 1992 (13 cases caused by wild polio virus type 1, which involved unvaccinated children, especially Rrom children, many of them being also infected with the human immunodeficiency virus HIV). WHO official reports show that our country recorded 18 cases in 1992. For the following years, the figures are as follows: 1993 – 10 cases, 1994 – 8 cases and 1995 – 5 cases. 1995 was the last year when our country recorded cases of polio (2, 7, 8).

![Fig. 1. Number of worldwide annual cases of polio and official immunisation rate / WHO/UNICEF estimates (July, 2013). Source: WHO](image)

In Romania, two types of vaccines have been available and used. One of them is the inactivated polio vaccine (IPV) – the first polio vaccine, recorded in 1955 in the US. The second one is the oral polio vaccine (OPV), approved in 1961 as a monovalent vaccine and in 1963 as a trivalent polio vaccine. After the introduction of the OPV vaccination at a global scale, the cases of polio associated to the vaccination (VAPP) started to occur. The World Health Organization concluded, with regard to the safety
of the polio oral vaccine, that there were 1,003 cases of paralysis associated with polio vaccination (VAPP) reported in 13 countries during 1970-1984, out of which 470 cases (47%) were recorded in Romania. After 1995, with the introduction of IPV in the immunisation of children in orphanages and the wide access to oral antibiotics, the incidence of vaccine-associated polio cases has reduced to a case/year on average; in other words, the risk is comparable to that found in other regions where polio immunisation is almost exclusively done with OPV (2, 3, 9).

**Inactivated polio vaccine** (IPV) is highly effective in producing immunity to poliovirus and protection against paralytic forms. Over 90% of vaccinated individuals develop antibodies against all three types of poliovirus after two doses and at least 99% are immune after the following three doses. Protection against paralytic polio correlates with the presence of antibodies (6, 7).

IPV produces less local gastrointestinal immunity than OPV, thus the individuals who receive IPV are more easily infected with the wild polio virus than those who are vaccinated with OPV. The duration of immunity following the IPV vaccination is not known with certainty, although the vaccine is likely to provide protection for many years after a full series of vaccinations has been completed (2, 7, 8).

**Oral polio vaccine** (OPV) is highly effective in producing immunity to poliovirus. A single dose of OPV produces immunity to all three viruses in the vaccine in approximately 50% of vaccinated individuals. Three doses of vaccine develop immunity to all three types of poliovirus in 95% of vaccinated subjects. As with other live virus vaccines, the immunity obtained following the vaccination with an oral polio vaccine is expected to last a lifetime. OPV produces excellent intestinal immunity, which helps to prevent infection with a wild virus (6, 7).

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type 3 vaccine virus (up to 85% in one study). A fourth dose – most studies use OPV for the fourth dose – usually produces seroconversion rates similar to those of the three doses of IPV or OPV (2, 7, 9). OPV trivalent vaccine was chosen in the United States (and in most countries) on its approval in 1963. The almost exclusive use of OPV has eliminated wild polio virus in the United States in less than 20 years. However, with every 2-3 million doses of OPV administered, there is a case of VAPP (vaccine-associated paralytic poliomyelitis), which has resulted in about 10 cases of VAPP in the US every year. In the period 1980-1999, VAPP was responsible for 95% of reported cases of paralytic polio in the United States. In 1996, an increase in the use of IPV was recommended, as part of an IPV/OPV sequential immunization schedule. This recommendation was intended to reduce the occurrence of paralytic polio associated with the vaccine (8, 9, 10). The sequential programme was intended to eliminate VAPP in vaccinated people as a result of the production of humoral immunity to the polio viruses in the vaccine with inactivated polio vaccine administered prior to the exposure to the live virus in the vaccine (2, 5, 9). As VPO was still used for the third and fourth dose in the polio vaccination programme, the risk of VAPP continued to exist among the close contacts of the vaccinated individuals, who were exposed to the vaccine live virus in the stool of the vaccinated people. The IPV/OPV sequential immunization schedule was widely accepted both by suppliers and by parents. In 1998 and 1999, fewer cases of VAPP were reported, proving the result of the increased usage of VPI. However, only a complete elimination of the OPV will lead to the elimination of VAPP.

To emphasize the goal of completely eliminating the paralytic polio in the United States, ACIP recommended in July 1999 that inactivated polio vaccine be used exclusively in the United States starting from 2000. OPV is no longer available in the US in routine programmes. The exclusive use of IPV prevented the vaccine live virus from spreading as well as the occurrence of any case of indigenous VAPP (7, 9, 10).

Tuberculosis

According to estimates, one third of the world population is infected with *M. tuberculosis*, and about 90% of infected people show latent asymptomatic infections; in their case, there is a 10% probability that during their lifetime, latent infection might progress to the stage of active tuberculosis (4, 8).

In 2007, 13.7 million chronic active cases were estimated worldwide. In 2010, nearly 8.8 million new cases were recorded as well as 1.5 million TB-related deaths, of which a fourth in patients also infected with HIV, mostly in countries in course of development. It is believed that the number of new cases of tuberculosis worldwide has been declining since 2002. Approximately 80% of the population of Asian and African countries test positive in tuberculin, compared to 10% of the US population. However, in developing countries, many people contract tuberculosis because of low immunity levels, in many cases as a side effect of HIV infection (2, 4).

The only available vaccine is BCG, which is effective against the spread of the disease in childhood, but with a varying degree of protection against pulmonary tuberculosis (therefore controversial). Despite this, over 90% of children are still vaccinated with BCG. Vaccination at an
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eyage provides immunisation for a period of about 10 years, but cases have been reported where false positive results were determined in the tuberculin skin test, which makes the test unreliable in identifying the disease (2, 11).

It has been shown that the effectiveness of BCG varies geographically. Thus, in India and Malawi it is not effective against tuberculosis (although it helps against leprosy) – the average efficiency is 50% and deaths are reduced by 70%; the protection against TB and miliary (disseminated) meningitis is 75-86%; the protection against pneumonia is 40%; the protection against febrile diseases is 18%. The protective effect lasts for at least 15 years. In many cases, it is assumed that the BCG vaccine alone is enough, and that a second vaccination does not provide extra protection (11, 12).

Tuberculosis occurs more frequently in Romania than in other European countries – the 6th position, according to a WHO ranking of reporting European countries – over 27,000 patients are treated annually for TB, of which more than 15,000 are new cases. It is estimated that an average of 130 cases occur per 100,000 inhabitants, compared to the European average of 30 patients per hundred thousand inhabitants. Of the 15,000 patients diagnosed with tuberculosis annually, 2,000 are relapses, and more than 500 cases develop a severe form, unresponsive to conventional therapy. A national strategy for TB control was drafted in Romania for the period 2015 - 2020, which aims at eliminating TB as a public health problem in Romania by 2020; in other words, TB incidence must decrease by 10% annually during this period (2).

The legal principles of public health assistance are: society’s responsibility for public health; focus on population groups and primary prevention; concern for health determinants: social, environmental, behavioural and health services; multidisciplinary and intersectoral approach; active partnership with the population and with central and local public authorities; decisions based on the best scientific evidence available at the time (evidence-based public health); under specific conditions, fundamental decisions based on the precautionary principle (1,2).

CONCLUSIONS

The most important roles of public health care refers to: developing policies, strategies and programmes regarding public health; monitoring and analysing the health of the population; public health planning; epidemiological surveillance, disease prevention and control; strategic management and marketing of public health services; prevention of epidemics, including the establishment of epidemiological state of alertness; protecting the population against environmental risks; informing, educating and communicating to promote health; ensuring the means for responding to disasters or threats to life and health, including the introduction of restrictions on the movement of people and goods (2, 12).

The main areas of intervention of public health assistance are: prevention, surveillance and control of transmissible and non-transmissible diseases by: providing immunisations; control of epidemics; disease surveillance; surveillance of behavioural risk factors; accident prevention; health monitoring, evaluation of the needs of the population in terms of public health services; health promotion and health education by information-education-communication campaigns (1, 2).
In this context, another important aspect needs to be emphasised – the close connection between the right to health and other fundamental rights: the right to life and physical and mental integrity; the right to respect for private and family life; the right to information and the right to a healthy environment.

REFERENCES