

"Doctors are responsible for making the final decision whether to vaccinate. The patient must be infection-free, so compulsory childhood vaccinations may be rescheduled accordingly"



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We talk to **Prof. Lidia Brydak**, director of the Influenza Virus Research Institute and the National Influenza Centre, and **Dr. Iwona Paradowska-Stankiewicz**, national consultant for epidemiology, about how vaccines work and why they are so important.



can contain live, attenuated bacteria or viruses with a reduced pathogenicity, or inactive (killed) microorganisms. In reality they are not complete pathogens but simply their fragments which are capable of inducing an immune response while not causing the disease itself. Vaccination aims to provide immunity to people at risk of infection, prevent the spread of disease, and in the long run eliminate it. A disease is said to be eliminated when its incidence is sporadic. It is also possible to eradicate diseases, although so far this has only been achieved with smallpox.

Are there any contraindications for vaccinations?

L.B.: Doctors are responsible for making the final decision whether to vaccinate. The patient must be infection-free at the time of inoculation, so compulsory childhood vaccinations may be rescheduled accordingly. Some vaccines contain egg protein, which may cause an allergic reaction. This doesn't make such an allergy an automatic contraindication, but benefits need to be weighed up against risks. The doctor should monitor the patient for signs of allergic response and administer medication if required.

My team works alongside clinicians conducting research into flu vaccine contraindications. For example, until recently patients with cardiological problems were advised against having the vaccine, but our studies have determined that the immunization is in fact safe. The vaccine is now even recommended for patients with pulmonary embolisms, since respiratory tract viruses damage epithelial tissue in the lungs increasing the risk of infection by other pathogens, which is a major complication. In recent years, the advice has also changed for pregnant women, who are now also advised to have the flu vaccine.

The current atmosphere surrounding vaccinations is rather negative. Why is that?

IWONA PARADOWSKA-STANKIEWICZ: I think it is a deeply-rooted problem, and I also don't think it's recent. When Edward Jenner was first administering the smallpox vaccine in the late 18th century, he was frequently depicted as a charlatan and monster. Vaccination is an invasive medical procedure and parents want to make sure their children won't be hurt and that they are safe. They rarely have any expert knowledge; they don't understand how vaccines work or the purpose of additives in the preparation, and this leads to fear.

Another issue is the growing number of supporters of "natural" lifestyles, who reject any medical intervention including vaccinations. Some people also believe that since illnesses we vaccinate against are rare, the risk of infection is low and therefore vaccination is unnecessary. Of course what they don't

HEALTH

ACADEMIA: Let's start by asking: what are vaccines?

LIDIA BRYDAK: Broadly speaking they are biological preparations, usually containing microbes or their fragments whose pathogenic properties have been eliminated; they are administered to patients to induce active immunity against diseases. Vaccines



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understand is that these illnesses are rare precisely because of "herd" immunity, which is only possible to achieve when the vast majority of the population is inoculated. Additionally, herd immunity protects those individuals who cannot be vaccinated for specific health reasons.

So when we send our children to preschool, the risk of infection depends on the vaccination status of other kids?

I.P.-S.: That's right. If over 90% of children in the group have been vaccinated, then the risk of infection in a child who is yet to have their shots for whatever reason is low. However, as soon as that figure drops below 85%, infectious diseases return. The vaccination rate only needs to drop by a few percentage points for herd immunity to be lost.

And yet some people are still reluctant to vaccinate, even when it is compulsory.

L.B.: When people are concerned about vaccines, I explain that they only contain fragments of the pathogen and they can't actually cause the disease itself – just like four wheels and a steering wheel don't make a car. Flu complications are an important consideration.

How many people in Poland avoid compulsory vaccinations?

I.P.-S.: During the first two quarters of 2015, the number of unvaccinated children was around 14,790 or approx. 2.1% of all young people up to 19 years old. In the previous year, the total number of people

rage flu epidemic in Poland, these losses are around 1.5 billion zlotys. Unfortunately, the flu vaccine is not refunded in Poland unlike in many other countries, even though vaccination is the only way of preventing transmission of the disease. Some employers pay for their staff to be immunized to protect their business against losses.

I.P.-S.: We can already see negative effects of people avoiding vaccinations. In the early 2015, a measles outbreak in Berlin resulted in over 700 cases, and one child died after contracting the disease. And this is the 21st century! As a result, in western Poland many people who had previously rejected the measles, mumps and rubella vaccine decided to take it after all. We have also seen an outbreak of diphtheria in Spain, until recently mainly known to many people – including doctors – as "croup" from *Anne of the Green Gables*. In Poland, the most recent case of diphtheria brought in from beyond the eastern border was noted in 2001, and a rapid response by epidemiology teams prevented the outbreak from spreading.

Another disease making an unwelcome return is whooping cough.

I.P.-S.: That's right; we have been seeing an increased incidence of whooping cough since the mid-1990s. We have been studying the disease to learn more about its epidemiology. For example, we have learned that the vaccine provides immunity for up to ten years, rather than several decades as previously thought. It also turns out that having been ill with whooping cough does not provide immunity from future infections. As the name suggests, in children

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avoiding vaccinations was around 12,700. This means we are, unfortunately, seeing a growth trend. For this trend to be halted and reversed, we need to educate the public about the benefits of vaccinations. We need to spread reliable, independent information based on rigorous clinical trials to contrast against some of the negative reports found online which stir powerful emotions while having no scientific basis.

Is it possible to estimate the losses caused by dropping vaccination rates?

L.B.: There is solid data available for flu; it doesn't include the costs incurred by medical treatment, but losses to businesses, such as staff taking sick leave or unable to work due to complications, etc. For an ave-

the cough is very distinctive and frequently leads to breathing problems, which means the child is usually seen and treated early. In adults, in particular the elderly who are a common source of infection in children, the disease is milder and presents as a chronic cough, which is frequently ignored. Even if the patient does consult a doctor, the disease may be difficult to diagnose. The cocoon strategy has been developed in response to this problem; the idea is to immunize mothers, relatives and any other individuals in contact with newborn infants to protect them until they are old enough to be vaccinated themselves.

Why is it important to vaccinate against flu? Many people see it as just a severe cold.

L.B.: It's extremely important to talk about losses due to flu. We recently saw a campaign by the middle-distance runner Adam Kszczot, who was prevented from participating in world championships after contracting the disease. We need more similar voices.

The Spanish flu pandemic in 1918-1919 claimed between fifty and a hundred million lives, and the Asian pandemic killed between one and four million between 1957 and 1958. The difference in numbers is largely due to the fact that a flu vaccine was available (it had been developed in 1941). Since sufficient numbers of people remembered the Spanish outbreak, immunization was widely accepted. The most recent pandemic occurred in the early 1970s. Although contracting the illness provides a higher degree of immunity than vaccination, we must not forget that flu really can be deadly. During the Polish pandemic in 1971, 5940 people lost their lives in such a short time that burying the dead became a major problem. According to World Health Organization's estimates, flu claims between 500,000 and a million lives per year. Flu can also cause many dangerous complications – heart or kidney problems, transplant rejection, meningitis or acute pneumonia, which may kill in as little as three days. Some of the most serious neurological complications are seizures.

Although flu complications may lead to death, they are rarely reported accordingly. For example, if a patient dies as a result of cardiological complications of flu, the death certificate usually states heart failure as the cause of death. Such skewed statistics mean that officially only 11 people died in Poland from flu complications in 2014, which does not reflect the much broader reality.

Why does flu persist despite vaccinations, and why do we need to be immunized every season?

L.B.: The flu virus is highly genetically diverse. Several different subtypes exist, and a few have been studied in depth. Epidemiological research allows us to predict which strain is likely to be the most active during a given season. We should also remember that at least 80% of the population needs to be vaccinated to reach herd immunity; during the 2014-2015 season, only 3.5% of adults and 0.4% of children in Poland were immunized. Even in the healthcare sector, whose employees are at particularly high risk of infection, the figure didn't exceed 6.4%!

Vaccination does not completely eliminate the risk of infection. Does the disease present differently depending on the patient's vaccination status?

L.B.: Vaccinated individuals may contract the disease if the vaccine didn't contain the strain currently in circulation. However, this generally leads to a milder

infection with fewer complications. Some people question the effectiveness of immunization because they contracted flu in spite of having been inoculated; we tell them that the same symptoms present in the case of infection with over 200 other viruses. Additionally, people who are vaccinated regularly gain an immunity to other viruses affecting the respiratory tract.

Another powerful argument against immunization is the risk of adverse reactions to the injection.

I.P.-S.: In spite of claims made by opponents of vaccination, monitoring of adverse reactions to vaccines

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has been legally binding in Poland since 1996. Any reaction diagnosed by a doctor must be reported to the State Sanitary Inspectorate. The incidents are reported to and analyzed at the National Institute of Public Health – National Institute of Hygiene. We should also remember that all medical interventions – not just vaccinations – carry a risk of complications, and this includes popular over-the-counter medications.

There is also the question whether all reactions to vaccinations are undesirable. In fact the answer is no, and many are simple physiological responses which don't need to be reported. Examples include a minor reddening around the inoculation site, a slightly raised temperature or mild agitation in the child.

And the risk of an adverse reaction remains lower than the risk resulting from not vaccinating at all.

I.P.-S.: That's right, but some people are unduly terrified. That's why the relationship between doctors and their patients is key. The doctor should explain the benefits of vaccination and what it protects against. They should also advise parents that certain mild symptoms may occur following the vaccination. This is especially important to prevent the parents from resorting to seeking information online, which may be misleading and lead them to decide against immunization. Open dialogue is incredibly important; after all, vaccines are one of the greatest medical achievements.

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