UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE
Cooperative Extension Service

Healthy Steps

Healthy Steps with Immunizations

More than two hundred years ago, Edward Jenner, a country physician practicing in England, noted that milkmaids rarely suffered from smallpox, a disease that was known to kill up to 40 percent of those who contracted it. The milkmaids often did get cowpox, a related but far less serious disease, and those who did, never became ill with smallpox. In an experiment that was to prove a revelation, Jenner took a few drops of fluid from a skin sore of a woman who had cowpox and injected the fluid into the arm of a healthy young boy who had never had cowpox or smallpox. Six weeks later, Jenner injected the boy with fluid from a smallpox sore, but the boy remained free of the dreaded smallpox. Dr. Jenner had discovered one of the fundamental principles of immunization. He had used a relatively harmless foreign substance to evoke an immune response that would protect someone from a disease.

It took some time to convince people that the benefits of vaccination outweigh the few risks. Today's vaccines are far safer and more protective than those early vaccines. As science advances, even better vaccines are being developed to protect us from disease.

Disease prevention is the key to public health. Vaccines benefit, in particular, the people who receive them, and in turn, those people cannot spread disease to others who have not been vaccinated. Infection cannot spread if it never gains a foothold. Infectious diseases cause enormous suffering, strain the capabilities of our health care system, and deplete financial resources. For the individual, the health care provider, and in the interest of conserving human and financial resources, it is always better to prevent a disease than to treat it. Veterinary vaccines benefit people, too. Some diseases, such as rabies, anthrax, certain types of encephalitis, and Rift Valley fever, are readily transmissible from animal species to humans. In many instances, livestock and pets are vaccinated not only for their own health, but for that of their owners. Many childhood diseases that were a normal part of growing up just 50 years ago are now preventable. Measles, rubella (German measles), mumps, pertussis, (whooping cough), and chickenpox were almost unavoidable. Most people did not reach adulthood without their families or circle of friends being touched by a serious illness or death caused by an infectious disease. For the most part, children suffered through the course of the disease and were left with naturally acquired immunity, some school work to catch up on, and perhaps a little pockmark somewhere on their skin. However, in some cases, children died, or they were left with permanent loss of hearing or sight or other tragic effects of serious infections.

Although most of us receive the great majority of our immunizations during childhood, it is important to remember that vaccines are not just for young children. Adolescents and adults should keep up-to-date on tetanus and diphtheria immunizations. Adults, who have not had diseases such as measles or chickenpox during childhood, or the vaccines to prevent them, should consider being immunized. Ironically, childhood diseases such as measles, mumps, and chickenpox can be far more serious in adults. People who travel overseas should determine, together with their physicians or at international travel clinics, which vaccines would be

appropriate based on their destinations. Effective vaccines are available to prevent yellow fever, polio, typhoid fever, hepatitis A, cholera, and other bacterial and viral diseases that are more prevalent abroad than in the United States. Each year, as we prepare for winter and the flu season, many adults should consider the benefits of the flu vaccine. In addition to flu vaccine, immunizations for pneumococcal pneumonia, hepatitis A, and hepatitis B are recommended for people who may be at risk.

As early as 2,500 years ago in Greece, some people understood enough about contagious diseases to know that a person who had recovered from plague would not get it again. Later, physicians recognized that a person acquires immunity to many diseases in this way. It is true that natural infection almost always causes better immunity than vaccines. Whereas immunity from disease often follows a single natural infection, immunity from vaccines usually occurs only after several doses. However, the difference between vaccination and natural infection is the price paid for immunity. The price paid for immunity after natural infection might be pneumonia from chickenpox, mental retardation from influenza, pneumonia from pneumococcus, birth defects from rubella, liver cancer from hepatitis B virus, or death from measles.

The purpose of a vaccine is to bring about active immunity by provoking a response from a person's immune system and creating a memory within the immune system so that exposure to the active disease agent will stimulate an already primed immune system to fight the disease. Some vaccines are combinations that protect against several diseases. Most of us are familiar with the DTP (diphtheria, tetanus, pertussis) and MMR (measles, mumps, rubella) vaccines that children in the United States receive. Scientists extensively test these combination vaccines to make sure that none of the antigens detracts from the immune priming effect of the others. Thus the vaccines can provide triple protection, the recipients are spared extra needle sticks, and the public health costs are reduced. Based on the biological and chemical characteristics of the disease-causing agent and on what type of immunity is desired, researchers begin to develop one of the following types of vaccines. Vaccines can be produced from 1-inactivated (or killed), 2-live, attenuated (or weakened), or 3-synthetic (or laboratory-made) microbial materials. One preservative contained in some vaccines is called thimerosal. Thimerosal contains mercury. Several studies have shown that when pregnant women ingest large quantities of mercury that are found in heavily contaminated fish, the developing fetus may be affected and later be found to have neurological disturbances. Recent studies by the National Institutes of Health showed that the levels of mercury contained in the blood of immunized children are similar to those in unimmunized children. But the Centers for Disease Control and Prevention and the American Academy of Pediatrics were concerned that, although there was no evidence that thimerosal caused harm, vaccines might be "perceived" as unsafe. So they recommended that thimerosal be removed from vaccines. The result is that all routinely recommended vaccines should be free of thimerosal since the Spring of 2001.

Because the signs of autism may appear in the second year of life, at around the same time children receive certain vaccines (such as MMR), some parents wonder whether vaccines might cause autism. But the vast weight of medical and scientific evidence now strongly refutes the finding of one British study that MMR caused autism in eight children. There is no scientific evidence that MMR vaccine causes autism.

A wealth of evidence now confirms the fact that vaccines do not cause diabetes. A recent study found that the immunization rates for Haemophilus influenzae type b (Hib) vaccine or the hepatitis B vaccine were the same in children with diabetes as in children without diabetes Although the incidence of diabetes is increasing throughout the world, the increase has occurred in countries with or without the introduction of new vaccines.

The number of children with SIDS has dramatically decreased since the hepatitis B vaccine was recommended for all infants. In fact, since all newborns were first recommended to receive the hepatitis B vaccine at birth, the incidence of SIDS has dramatically decreased, not increased. The decline in the number of children with SIDS is not because of the hepatitis B vaccine, but rather because of a change in sleep position for infants recommended by the American Academy of Pediatrics.

Although the cause or causes of multiple sclerosis are not known, multiple sclerosis is not caused by the hepatitis B vaccine. A large, carefully controlled study of about 238,000 nurses found that the risk of multiple sclerosis was the same in those who received the hepatitis B vaccine as in those who didn't receive the vaccine. Vaccines don't exacerbate the symptoms of multiple sclerosis in people who already have the disease. The average age of people with multiple sclerosis is exactly the same now as it was before the hepatitis B vaccine was first used in this country.

Because vaccines are given to people who are not sick, they are held to the highest standards of safety. As a result, they are among the safest things we put into our bodies.

All vaccines have possible side effects. Most side effects are mild, such as pain or tenderness where the shot is given. But some side effects of vaccines can be severe. For example, vaccines, like all medicines, have been found to rarely cause a severe allergic reaction called anaphylaxis. Symptoms of anaphylaxis can occur within 15 minutes of getting any vaccine and include hives, difficulty breathing, and low blood pressure. Although the reaction can be treated, it can also be quite frightening.

Unfortunately, choosing to avoid vaccines is simply a choice to take a different risk. Unvaccinated individuals are at risk from many diseases including meningitis caused by Hib, bloodstream infections caused by pneumococcus, pneumonia caused by measles, deafness caused by mumps, and liver cancer caused by hepatitis B virus.

When you compare the risk of vaccines and the risk of diseases, vaccines are the safer choice.

Some adults incorrectly assume that the vaccines they received as children will protect them for the rest of their lives. Generally this is true, except that:

- Some adults were never vaccinated as children.
- Scientific discoveries are always being made, bringing vaccines into our lives that were not around during our childhood.
- The immunity provided by some of the vaccines received in childhood begins to fade over time.

- Adults become more susceptible to serious disease caused by common infections as they age. (For example, flu, pneumococcus)

Vaccines needed for all Adults (unvaccinated, medical conditions or compromised immune function)

- Varicella (chickenpox) vaccine
- Hepatitis B vaccine
- Measles-Mumps-Rubella (MMR) vaccine
- Diphtheria-Tetanus vaccine (booster every 10 years)

Additional vaccines needed for those over the age of 50

- Influenza vaccine (for the flu)

Additional vaccines needed for those over the age of 65

- Pneumococcal vaccine

Additional vaccines needed for all health-care workers of all ages

- Influenza vaccine

Additional vaccines needed for child-care center workers of all ages

- Influenza vaccine
- Hepatitis A vaccine

The following chart provides a suggested timetable for children. The child's doctor may choose a somewhat different schedule, but you can generally count on the following vaccines at the ages indicated.

Birth	2 months	4 months	6 months	12 months	15 months	18 months	4-6 years
HBV #1	DTaP #1	DTaP #2	DTaP #3	MMR#1	Hib #4	Polio #3	MMR #2
	Polio #1	Polio #2	Hib #3	Varicella	HBV #3	DTaP #4	Polio #4
	Hib #1	Hib #2	PCV #3		PCV #4		DTaP #5
	HBV #2	PCV #2					
	PCV #1						

HBV – Hepatitis B Virus
DTaP – Diptheria, Tetanus, and Pertussis
Hib – *Haemophilus influenzae* Type b
PCV -- Pneumococcal
MMR – Measles, Mumps, Rubella

Comprehensive immunization recommendations from CDC are at:

- Adults http://www.cdc.gov/nip/recs/adult-schedule.htm

- Children http://www.cdc.gov/nip/recs/child-schedule.htm#Printable