Immunization

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Abstract

Immunization is the process of protecting the body against disease by means of vaccines or serums.

Introduction

Every living thing on this planet has natural immunity by birth. In humans, new born receive this natural immunity in the form of antibodies from mother. These antibodies are transferred to the infant through breast milk. However, this form of immunity is temporary, lasting only through early infancy. Thus it is very necessary for everybody to have immunity against the crippling & deadly diseases. Immunizations are a way to stimulate the body to produce immunity to an offending agent (bacteria or virus). This form of immunity is referred to as acquired immunity. Small doses of an antigen (offending agent) are administered to activate the immune system to "recognize" the foreign agent and produce antibodies to it. In effect, the immune system "remembers" this agent and considers it an enemy of the body. Future exposure to this agent can be quickly neutralized by the development of antibodies. A major advantage of the discovery of immunization is that it protects most people against many infectious diseases.

Types of Immunization

There are two types of immunization.

- Active immunization involves the use of vaccines, and
- Passive immunization uses serums

ACTIVE IMMUNIZATION is another term for vaccination. A vaccine contains substances that stimulate the body's immune system to produce antibodies against a particular infectious disease. These antibodies protect the person if he or she is exposed to the actual disease-causing organism. Vaccines contain substances that are powerful enough to trigger antibody production but that do not actually cause disease. Vaccines have been developed against many diseases, including chickenpox, diphtheria, influenza, measles, meningitis, mumps, pneumococcal pneumonia, poliomyelitis, rabies, rubella (German measles), tetanus, whooping cough, and yellow fever.

Most vaccines are injected into the body. Sabin polio vaccine is taken orally. A single dose of some vaccines provides lifelong protection against infection. Other vaccines require several doses to produce immunity and then must be reinforced at regular intervals with booster doses.

Throughout the world, most physicians recommend that all children be vaccinated against nine diseases--diphtheria, measles, meningitis caused by the bacterium Haemophilus influenzae type b, mumps, polio, rubella, tetanus, whooping cough, and hepatitis B. Influenza vaccine is given routinely to sick and elderly people. Vaccines are safe and dependable, but they are not perfect.

PASSIVE IMMUNIZATION involves the injection of serum into the body. A serum contains antibodies that have been formed in another person or an animal. It provides almost immediate protection from infection. But this immunity lasts only a few months because the antibodies gradually disappear. Physicians give serums to people who already have been exposed to such diseases as hepatitis, measles, rabies, and tetanus. Vaccines may work too slowly to help these patients. Doctors also use serums to protect people against diseases for which vaccines have not been developed.

Misconceptions About Immunization

Immunizations should be part of routine health care obtained through one's personal physician (or in some instances, through one's local health department). Long-lasting protection is available against ten diseases: measles, mumps, German measles (rubella), poliomyelitis, tetanus (lockjaw), whooping cough (pertussis), diphtheria, chickenpox (varicella), Hemophilus influenzae b (Hib), and hepatitis B. Immunization is also important for adults. Those unprotected against any of the diseases just discussed (except whooping cough) should consult their physicians. Tetanus boosters should be administered every ten years. Flu shots (which give only seasonal protection) & immunization against pneumococcal pneumonia is recommended for high-risk patients, elderly individuals, and certain institutional populations

BECAUSE OF BETTER HYGIENE AND SANITATION, DISEASES HAD ALREADY BEGUN TO DISAPPEAR BEFORE VACCINES WERE INTRODUCED:
Statements like this suggest that vaccines are not needed. Improved socioeconomic conditions have undoubtedly had an indirect impact on disease. Better nutrition, not to mention the development of antibiotics and other treatments, have increased survival rates among the sick; less crowded living conditions have reduced disease transmission; and lower birth rates have decreased the number of susceptible household contacts. But looking at the actual incidence of disease over the years can leave little doubt of the significant direct impact vaccines have had, even in modern times. The statistics shows that all other vaccine-preventable diseases show a drastic drop in cases corresponding with the advent of vaccines.

THE MAJORITY OF PEOPLE WHO GET THE DISEASE HAVE BEEN IMMUNIZED:
This is another argument frequently found in anti-vaccine literature - the implication being that this proves vaccines are not effective. In fact it is true that in an outbreak those who have been vaccinated often outnumber those who have not - even with vaccines such as measles, which we know to be about 98% effective when used as recommended.

This apparent paradox is explained by two factors:
First, no vaccine is 100% effective. To make vaccines safer than the disease, the bacteria or virus is killed or weakened (attenuated). For reasons related to the individual, not all vaccinated persons develop immunity. Most routine childhood vaccines are effective for 85% to 95% of recipients.
Second, in a country such as the India the people who have been vaccinated vastly outnumber those who have not.

THERE ARE "HOT LOTS" OF VACCINE THAT HAVE BEEN ASSOCIATED WITH MORE ADVERSE EVENTS AND DEATHS THAN OTHERS. PARENTS SHOULD FIND THE NUMBERS OF THESE LOTS AND NOT ALLOW THEIR CHILDREN TO RECEIVE VACCINES FROM THEM:
This misconception got considerable publicity recently when vaccine safety was the subject of a television news program. First of all, the concept of a "hot lot" of vaccine as it is used in this context is wrong. It is based on the presumption that the more reports to VAERS a vaccine lot is associated with, the more dangerous the vaccine in that lot; and that by consulting a list of the number of reports per lot, a parent can identify vaccine lots to avoid.
THIS IS MISLEADING FOR TWO REASONS:
VAERS (the Vaccine Adverse Events Reporting System) is a system for reporting events that occur after the administration of any vaccine i.e. a VAERS report does not mean that the vaccine caused the event. Although vaccines are known to cause minor, temporary side effects such as soreness or fever, there is little, if any evidence linking vaccination with permanent health problems or death. The point is that just because an adverse event has been reported to VAERS does not mean a vaccine caused it.
Vaccine lots are not the same. The sizes of vaccine lots might vary from several hundred thousand doses to several million, and some are in distribution much longer than others are. Naturally a larger lot or one that is in distribution longer will be associated with more adverse events, simply by chance. Also, more coincidental deaths are associated with vaccines given in infancy than later in childhood, since the background death rates for children are highest during the first year of life. So knowing that lot A has been associated with X number of adverse events while lot B has been associated with Y number would not necessarily say anything about the relative safety of the two lots, even if the vaccine did cause the events.
Comparing the risk from disease with the risk from the vaccines can give us an idea of the benefits we get from vaccinating our children. The following table compares these risks for six diseases:

Disease Related Risks Adverse Effects Of Vaccination

Measles Pneumonia: 1 in 20 Encephalitis: 1 in 2,000 Death: 1 in 3,000 Mumps Encephalitis: 1 in 300 Rubella Congenital Rubella Syndrome: 1 in 4, (if woman becomes infected early in pregnancy)	MMR Vaccine Encephalitis or severe allergic reaction: 1 in 1,000,000
Diphtheria Death: 1 in 20 Tetanus Death: 3 in 100 Pertussis Pneumonia: 1 in. 8. Encephalitis: 1 in 20 Death: 1 in 200	DTP Vaccine Continuous crying, then full recovery: 1 in 100. Convulsions or shock, then full recovery: 1 in 1,750. Acute encephalopathy: 0-10.5 in 1,000,000 Death: None proven

The fact is that a child is far more likely to be seriously injured by one of these diseases than by any vaccine. While any serious injury or death caused by vaccines is too many, it is also clear that the benefits of vaccination greatly outweigh the slight risk and that many, many more injuries and deaths would occur without vaccinations. In fact, to have a medical intervention as effective as vaccination in preventing disease and not use it would be unconscionable.

GIVING A CHILD MORE THAN ONE VACCINE AT A TIME INCREASES THE RISK OF HARMFUL SIDE EFFECTS AND CAN OVERLOAD THE IMMUNE SYSTEM

Children are exposed to many foreign antigens every day. Eating food introduces new bacteria into the body, and numerous bacteria live in the mouth and nose, exposing the immune system to still more antigens.

An upper respiratory viral infection exposes a child to 4-10 antigens, and a case of "strep throat" to 25-50.

A number of studies have been conducted to examine the effects of giving various combinations of vaccines simultaneously. In fact, neither the Advisory Committee on Immunization Practices (ACIP) nor the American Academy of Pediatrics (AAP) would recommend the simultaneous administration of any vaccines until such studies showed the combinations to be both safe and effective. These studies have shown that the recommended vaccines are as effective in combination as they are individually, and that such combinations carry no greater risk for adverse side effects. **For the bad effects of any vaccine homoeopathic medicines like *Thuja*, *Silicea*, *Malandrinum* and *Arsenic Alb* are very effective.**

Immunization For Babies

Check with your Doctor to make sure your baby is getting immunized on time. Make sure you ask your Clinic to give you a record card with all the dates of your baby's vaccination shots.

Hep-B: protects against Hepatitis B, a serious liver disease
DTaP: protects against Diptheria, Tetanus and Whooping Cough (Pertussis)
Hib: protects against Haemophilius Influnzae type b
Polio: inactivated (injected vaccine (IPV) and oral vaccine (OPV0 protects against polio
MMR: protects against Measles, Mumps and Rubella (German Measles)
VAR: varicella zoster vaccine protects against chickenpox
This is the age range in which this vaccine should be given.
Depending on the brand of Hib vaccine used for the 1st and 2nd doses, a dose at 6 months of age may not be needed.
If an all OPV or an all IPV vaccine schedule is used, the 3rd dose may be given as early as 6 months of age.
DTaP may be given as early as 12 months if 6 months have elapsed since the previous dose and if the child might not return by 18 months of age.

Vaccine	**Ages usually given, other guidelines**	**If child falls behind-minimum intervals**	**Contraindications**
DTaP Contains acellular pertussis DTP or DTwP contains whole cell pertussis Give IM	DTaP is preferred for all doses in the series but DTwP is acceptable. Give at 2m, 4m, 6m, 15-18m, 4-6yrs of age. May be given #1 as early as 6 wks of age. May give #4 as early as 12m of age if 6m has elapsed since #3 and the child is unlikely too return at age 15-18m. If started with DTwP may complete series with DTaP. Donot give DTaP or DTwP to children ≥ 7yrs of age (give Td) DTaP?DTwP may be given wih all other vaccines but at a separate site.	#2 & #3 may be given 4 wks after previous dose. #4 may be given 6m after #3. If 4# is given before4th birthday, wait at least 6m for #5. If34 is given after 4th bithday, 5# is not needed. Don't restart series, no matter how long since previous dose.	(DTaP and DTwP have the same contraindications and precautions) Anaphylactic reactions to a prior dose or to any vaccine component. Moderate or severe acute illness. Don't postpone for minor illness. Previous encephalopathy within 7 days after DtaP / DTwP. Undiagnosed progressive neurologic problem. Precautions: The following are precautions not contraindications. Generally when these conditions are present, the vaccines shouldn't be given. But there are situations when the benefit overweighs risk

			so vaccination should be considered (e.g. pertuussis out break). Previous rxn of T≥ 105^0 F within 48 hrs after dose. Previous continuing crying lasting 3 or more hrs within 48 hrs after dose. Previous convulsion within 3 days after immunization. Previous pale or limp episode or collapse within 48 hrs after dose.
DT Give IM	Give to children< 7yrs of age if the child has had a serious reaction to the "P" in DTaP/DTwP, or if the parents refuse the pertussis component. DT can be given with all other vaccinations but at a separate site.	For children who have fallen behind, use information in bob directly above.	Anaphylactic reaction to a prior dose or to any vaccine component. Moderate or severe acute illness. Don't postpone for minor illnesses.
Polio IPV and OPV Give IPVSQ or IM Give OPV PO	Give at 2m, 4m, 12-18m, 4-6 yrs of age. (If all OPV or all IPV is given, #3 may be given as early as 6m of age) It is recommended to follow "Sequential Schedule): IPV for #1 and #2 and OPV for #3 and #4. If minimal intervals and ages are followed, any combination of 4 doses given by 4-6 yrs of age is considered a complete series. Not routinely given to anyone ≥ 18 yrs of age (except certain travelers). IPV vaccine can be given with all other vaccines but at a separate site. OPV may be given with all other vaccines.	#1 & #2 (IPV or OPV) should be separated by at least 4 wks. If #3 of an all IPV or all OPV series is given at ≥ 4 yrs of age, dose #4 is not needed. Children on an IPV/OPV "sequential" schedule must receive all 4 doses, regardless of the age when first initiated.	Anaphylactic reaction to a prior dose or to any vaccine component. Moderate or severe acute illness. Don't postpone for minor illnesses. Use IPV when an adult in the household or other close contact has never been vaccinated against polio. In pregnancy, neither OPV nor IPV is recommended. The following are the contraindications for OPV so use IPV in these situations: Cancer, Leukemia, Lymphoma, and Immunodeficiency including HIV/AIDS. Taking a drug that lowers resistance to infection e.g. anti cancer, high dose steroids. Someone in the household has any of the above medical problems.

Td	Use for persons > 7 yrs of age. A booster dose is now recommended for children 11-12 yrs of age if 5 yrs have elapsed since previous dose. Then boost every 10 yrs. Td may be given with all other vaccines but at a separate site	For those never vaccinated or behind or if the vaccination history is unknown, give dose #1 now; dose #2 4 wks later; dose #3 6m after 32; and then boost every 10 yrs.	Anaphylactic reaction to a prior dose or to any vaccine component. Moderate or severe acute illness. Don't postpone for minor illnesses.
MMR Give SQ	Two doses of MMR for all children up to 18 yrs of age. Give #1 at 12-15m. Give #2 at 4-6 yrs. Can give as early as 6m of age in an outbreak but two routine doses will still need to be given at $\geq$ 12m of age. If a dose was given before 12m of age, give #1 at 12m of age. If a dose was given at 12m of age, give #1 at 12-15m of age with a minimum interval of 1m between these doses. If MMR and VAR (and any other live virus vaccine except polio) are not given on the same day, space them $\geq$ 28days apart. May give with all other vaccines but at a separate site.	Give whenever behind. Exception: If MMR and VAR (and any other live virus vaccine except polio) are not given on the same day, space them $\geq$ 28days apart. There should be minimum interval of 28days between MMR #1 and MMR #2. Dose #2 can be given at any time if at least 28days have elapsed since dose #1 and both doses are administered after 1 year of age. This also applies if dose #2 is given before 4-6 yrs of age. Don't restart series, no matter how long since previous dose.	Anaphylactic reaction to a prior dose or to any vaccine component. Pregnancy or possible pregnancy within next 3m (Use contraception) Moderate or severe acute illness. Don't postpone for minor illnesses. If blood products or immunoglobulin have been administered during the past 11 months. HIV positively is NOT a contraindication to MMR except for those who are severely Immunocompromised. Immunocompromised persons due to cancer, leukemia, lymphoma. Note: For patients on high dose immunosuppressive therapy consult your attending expert regarding delay time.

Hib Give IM	HibTITER (HbOC) & AcHib (PRP-T): Give at 2m, 4m, 6m, 12-15m. PedavaxHib (PRP-OMP): Give at 2m, 4m, 12-15m. Dose #1 of all Hib vaccines may be given as early as 6 wks of age but don't give it any earlier than 6wks of age. May give with all other vaccines but at a separate site.	Rules for all Hib vaccines: If the child is $\geq$ 15m of age, only 1 dose is given. Not routinely given to children $\geq$ 5yrs of age. Give boosters dose a minimum of 2m after previous dose. Don't restart series, no matter how long since previous dose. Rules for HgOC (HibTITER) & PRP-T (ActHib) only: If #1 is given up to 7m, give #2 & #3 spaced 1-2m after previous dose and boost at 12-15m.If #1 is given at 7-11m only 3 doses are needed: #2 given 1-2m after #1, then boost at 12-15m.If #1 is given at 12-14m, give a booster dose in 2m. Rules for PRP-OMP (PedvaxHib) only: If #1 is given at 3-11m of age, give #2 1-2m later and boost at 12-15m. If #1 is given at 12-14m, boost 2m later.	Anaphylactic reaction to a prior dose or to any vaccine component. Moderate or severe acute illness. Don't postpone for minor illnesses.

Hep-B Give IM	Vaccinate All children from 0-18 yrs of age. For infants give at 0-2m, 1-4m, 6-18m of age. For older children/teens, spacing options include; 0m, 1m, 6m; 0m, 2m, 1-4m; or 0m, 1m, 4m. Children who were born or whose parents were born in countries of high HBV endemicity or who have other risk factors should be vaccinated as soon as possible. If mother is HbsAg positive: give HBIG and Hep-B#1 within 12 hrs of birth, #2 at 1-2m and #3 at 6m of age. If mothers HbsAg status is unknown: give Hep-B #1within 12 hrs of birth, #2 at 1-2m and #3 at 6m of age. If mother is later found to be HBsAg positive, her infant should receive the additional protection of HBIG within the first 7 days of life. If mother is not chronically infected but is from an endemic area: complete series by 6m of age. May give with all other vaccines but at a separate site.	Don't restart series, no matter how long since previous dose. 3 dose series can be started at any age. Minimum spacing for children and teens: 4 wks between #1 & #2 and 2m between #2 and #3. Overall three must be 4m between #1 and #3. Note Regarding Dosing : *Read the package insert to determine the volume of vaccine to administer*	Anaphylactic reaction to a prior dose or to any vaccine component. Moderate or severe acute illness. Don't postpone for minor il

General Vaccine Questions:

Q. When the expiration date of a vaccine indicates a month and year, does the vaccine expire on the first or last day of the month?
Ans. Vaccine may be used through the last day of the month indicated on the expiration date.

Q. When giving two IM injections in the same limb, what is the minimum spacing between the two injections?
Ans. The vaccine should be separated by at least one inch in the body of the muscle so that any local reactions are unlikely to overlap.

Q. Is it safe to give a vaccine directly in to an area where there is tattoo?
Ans. Both intramuscular and subcutaneous vaccines may be given through a tattoo.

Q. What are the risks of not aspirating prior to an IM or SQ injection of a vaccine?
Ans. Aspiration is recommended in order to avoid injecting vaccine in to a vein or artery. If blood is returned when the syringe is aspirated, the vaccine dose should not be injected.

Q. Do patients with sickle cell disease or functional asplenia have any special vaccination recommendations?
Ans. Sickle cell disease often causes spleen damage. Persons two year of age and older with sickle cell disease should receive pneumococcal vaccine. A second dose of pnemococcal vaccine is recommended for this group (and other persons without a functional spleen) 5 years after the first dose. Persons without a functional spleen (including persons with sickle cell disease) should also receive a single dose of meningococcal vaccine and a single dose of Hib vaccine, if they have not already been vaccinated against Hib.

Q. Why is Varicella vaccine contraindicated in patients with HIV when MMR usually is not?
Ans. There are very few data on the safety and efficacy of Varicella vaccine in persons with HIV infection and as such it was not recommended. Still studies are going on for the use of Varicella vaccine in HIV infected patients.

Q. If a pregnant woman with no history of Varicella disease is exposed to Varicella, what should be done?
Ans. Pregnant women should never be given Varicella vaccine. If a susceptible pregnant woman has a substantial exposure to Varicella, the use of Varicella zoster immune globulin (VZIG) should be strongly considered.

References:
1> Murphy's Materia Medica
2> MayoClinic.com
3> Mosby's Medical Encylopedia