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CHALLENGING MINDS, CHANGING LIVES

Commentary

Vaccinations: Reducing the Burden of Disease[a]

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Vaccination is believed by some to have greatly reduced the burden of infectious diseases. Yet vaccines represent one of the most divisive medical therapies, and it is not possible to make a knowledgeable decision unless one knows both sides of the story. The World Health Organization defines a vaccine as, "a biological preparation that improves immunity to a particular disease. A vaccine typically contains an agent that resembles a disease-causing microorganism, and is often made from weakened or killed forms of the microbe, its toxins, or one of its surface proteins. The agent stimulates the body's immune system to recognize the agent as foreign, destroy it, and "remember" it, so that the immune system can more easily recognize and destroy any of these microorganisms that it later encounters."

The website, "Vaccines.gov" explains that vaccines cause immunization by producing immunity from a disease and can be administered by way of needle injections, by mouth, or by aerosol. So a vaccination is the injection of a killed or weakened organism that produces immunity in the body against that organism, whereas immunization is the process by which a person or animal becomes protected from a disease. In short, vaccines help develop immunity by imitating an infection. This type of infection then causes the immune system to produce T-lymphocytes and antibodies. After the imitation infection goes away, the body is left with a stock pile of "memory" T-lymphocytes and B-lymphocytes that will remember how to fight that disease in the future. Because it takes a few weeks for the body to produce T-lymphocytes and B-lymphocytes after vaccination, it is possible that a person who was infected with a disease just before or just after vaccination could develop symptoms and get a disease, because the vaccine has not had enough time to provide protection. Sometimes, after getting a vaccine, the imitation infection can cause minor symptoms, such as fever; minor symptoms like this are normal and should be expected as the body builds immunity.

Vaccines are made using several different processes. They may contain live viruses that have been attenuated (weakened or altered so as not to cause illness); inactivated or killed organisms or viruses; inactivated toxins (toxins generated by the bacteria); or merely segments of the pathogen (including both subunit and conjugate vaccines). Presently, the live, attenuated vaccines recommended as part of the U.S.

Childhood Immunization Schedule include measles, mumps, and rubella (via the combined MMR vaccine), varicella (chickenpox), and influenza (in the nasal spray version of the seasonal flu vaccine). The immunization schedule also includes vaccines of every other major type. The different types of vaccines are shown in Table 1.

Table 1
Types of Vaccines, 2015

Vaccine type	**Vaccines of this type on U.S. Recommended Childhood (ages 0-6) Immunization Schedule**
Live, attenuated	Measles, mumps, rubella (MMR combined vaccine) Varicella (chickenpox) Influenza (nasal spray) Rotavirus
Inactivated/Killed	Polio (IPV) Hepatitis A
Toxoid (inactivated toxin)	Diphtheria, tetanus (part of DTaP combined immunization)
Subunit/conjugate	Hepatitis B Influenza (injection) *Haemophilus influenza* type b (Hib) Pertussis (part of DTaP combined immunization) Pneumococcal Meningococcal

Accessed from http://www.historyofvaccines.org/content/articles/different-types-vaccines

Vaccines are credited with having eliminated polio in the United States which was once America's most-feared disease, causing death and paralysis. Vaccination, according to both the Center for Disease Control and the World Health Organization, is very safe and effective because "vaccines are only given to children after a long and careful review by scientists, doctors, and healthcare professionals." Both organizations insist that serious side effects following vaccination are very rare and that the benefits far outweigh any associated side effects. Also, due to the re-emergence of measles and whooping cough (pertussis) over the past few years, it has been advised by the CDC that vaccination is necessary in order to fully protect children and to prevent the spread of these diseases to family and friends. Furthermore, a child with a vaccine-preventable disease can be denied attendance at schools or child care facilities. Finally, vaccines have reduced, and, in some cases, eliminated many diseases that killed, or severely disabled people just a few generations ago (Five Important Reasons to Vaccinate Your Child, 2015).

As a result of the strong recommendations from organizations such as the CDC to vaccinate, all 50 states require the vaccination before school attendance is allowed. Although many states allow for certain exclusions including religious beliefs, Mississippi does not do so (although it does allow for exclusion with regards to the health of a child if the child is prone to allergic reactions that are noticeably severe as stated by a physician).

Mississippi, because of its strict rules regarding vaccinations, leads the country with the highest percentage of vaccinated children. Immunizations against childhood diseases are required by Mississippi law in order to enter school, Head Start, or day care. Specific vaccinations are also recommended for students entering high school or college. The Mississippi State Department of Health provides all necessary immunizations at low cost and they are free to those who qualify for the Vaccines for Children program (Mississippi Department of Health, 2015).

Despite their attributes, and unlike medical treatments which are given to relieve the symptoms of illness, vaccines are given to otherwise healthy babies, children, and adults. Therefore, the requirement to ensure safety is greater for vaccines than for any other medical product or procedure. Adverse drug reactions create a serious public health concern and represent one of the leading causes of morbidity and mortality worldwide. More than a half million children are treated every year for adverse drug reactions in US outpatient clinics and emergency rooms (Grenier, Doherty, & Medaglia, 2003).

The Shanghai study, based on reported pediatric adverse drug reactions for 2009, found that 42 percent of adverse drug reactions were caused by vaccines, with reactions ranging from mild skin rashes to deadly reactions like anaphylaxis and death. Of all the drugs causing adverse reactions among children, vaccines are the most commonly reported (Li et al., 2014).This study is particularly significant because the vast majority of reports came from physicians, pharmacists, and other health care providers. Less than three percent of the reports were from consumers.

Three major trends emerged in the Chinese drug reaction study:

- Males (60 percent) were represented more than females (40 percent)
- Young children were more susceptible to harm; 65 percent of the adverse drug reactions were reported for children age 5 and under, and about 40 percent involved children aged 2 months to 2 years. The highest proportion of serious reports was for newborns (0 to 1 month).
- The more drugs a child is exposed to, the higher the proportion of *serious reactions*; drug-to-drug interactions (DDI) are increasingly problematic with today's practice of "polypharmacy"(using two or more drugs together).

Furthermore, an article purporting to find that black children are at substantially increased risk for autism after early exposure to the measles-mumps-rubella vaccine has been removed amid claims that a CDC whistleblower has accused health officials of suppressing information about the link between vaccinations and autism. Not surprisingly, the prospect that the CDC has been sitting on evidence of an autism-vaccine connection for more than a decade has inflamed the vaccine critics. The paper entitled, “Measles-mumps-rubella vaccination timing and autism among young African American boys: a reanalysis of CDC data,” was written by Brian Hooker, an engineer-turned-biologist and an active member of that community. This article has been removed from the public domain because of serious concerns about the validity of its conclusions. The journal and publisher believe that its continued availability may not be in the public interest. Definitive editorial action has been delayed pending further investigation. It has recently been reported that the whistleblower has been given immunity by the Obama administration and will be scheduled to speak before congress.

To add insult to injury, on September 23, 2014, an Italian court in Milan awarded compensation to a boy for vaccine-induced autism. Presiding Judge Nicola Di Leo considered various materials among including a 1271-page confidential GlaxoSmithKline report which provided ample evidence of adverse events from the vaccine, including five known cases of autism resulting from the vaccine's administration during its clinical trials (Holland, 2014). It should also be noted that both Switzerland and Italy have banned the sales of Novartis' flu vaccines, Agrippal and Fluad, after being told by the pharmaceutical company that the shots had an accumulation of "particles" within them (Novartis Flu Vaccines Banned In Italy And Switzerland, 2012).

In conclusion, despite its many stated benefits by the scientific community, all parents and patients should be informed about the risks and benefits of preventive and therapeutic procedures, including vaccinations. However, despite best efforts to educate parents about the effectiveness of vaccines and the realistic chances of vaccine-associated adverse events, some will decline to have their children vaccinated. Nevertheless, the personal and religious beliefs of parents and patients should be respected.

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