Vaccinations

The MMR triple shot, Andrew Wakefield and Autism

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Disclaimer: I am not a medical professional. The information in this report is based on research completed both online and from outside sources; it is not guaranteed to be accurate. It is to be read solely as an analysis, to be taken as general in nature, and should not substitute the advice of a qualified medical professional.
Picture a routine vaccination visit to the pediatrician’s office. Led to the back, your toddler’s height, weight and temperature are taken. In the examination room waits a silver tray lined with a number of sterile syringes, each one a protection against a number of diseases. After a few tears, you leave the office with your child and move on with your day.

Months later, your child begins to act differently. You notice delays in social interaction, play behavior and difficulty with communication. Your son or daughter also has trouble connecting with kids their age and making friends. After consulting your pediatrician and undergoing some tests, you find out that your child is showing an onset of autism. What caused this? Your child was on track with development before, but now they have regressed. There is talk in the media about a vaccine that protects against the measles, mumps and rubella. Some people think there is a link to autism and other autism-related disorders. Your son or daughter received that very vaccination a few months ago. Could the routine MMR vaccine that so many children receive each year be to blame?

Today, vaccinations have become a hot topic of debate. Do the risks of the side effects (including the possible link to autism) outweigh the benefits? Some diseases the vaccinations protect against have not been seen in the United States in decades, so why do we continually need to vaccinate against them if they are no longer a threat? The truth is that those diseases are still a threat, but some parents feel as though the risks to their child are worth it. How does one decide whether or not to vaccinate?

In this paper I would like to analyze the overall controversies surrounding vaccinations giving specific attention to the Measles, Mumps and Rubella (MMR) vaccines and its supposed link to autism and the Andrew Wakefield misinformed and biased study of the late 1990’s. The spread
of the information to the public and around the world also plays an important role in this analysis, so I will address that as well. First, however, I feel it is necessary to really understand what a vaccine does and give a general overview of the common controversies surrounding vaccines today.

**What is a vaccine and how does it work?**

From birth, our immune systems are composed of a system of cells, glands and organs. When antigens (foreign invaders/germs) enter our bodies, we produce antibodies to fight them off. The antibodies often disappear once the germ is defeated, but the cells involved in antibody production stay and in turn become what is called a “memory cell”. Memory cells remember the original antigen, helping the body to fight it again in the future, giving someone immunity.

Vaccines contain antigens or parts of antigens that cause disease, but those in the vaccines are either dead or severely weakened; these antigens are not strong enough to cause disease. They are strong enough for the body to produce the necessary antibodies to fight against them, however. The memory cells prevent re-infection of the disease in the future.

**The vaccine controversy begins**

According to the Centers for Disease Control and Prevention (CDC), some diseases have become very rare within the United States largely because our society has vaccinated against them for decades. The CDC’s website states, “Vaccinations are one of the best ways to put an end to the serious effects of certain diseases.” Today, vaccinations have taken control of diseases such as polio, measles, diphtheria, pertussis (whooping cough), rubella, mumps and tetanus.
Safeguarding your child against a disease that could kill them should be of every parent’s best interest, but some are more wary of the possible side effects the vaccines may bring. Vaccinations protect both the people who receive them and those people who surround that person in the world every day. In essence, we receive vaccines not only for ourselves, but for the greater good of the population, so why would someone want to jeopardize that?

In the April 2010 PBS Frontline documentary *The Vaccine War*, parents shared their views on why they chose not to vaccinate. Although cities across America have been discovered, Ashland, Oregon in particular has one of the lowest vaccination rates where “28% of its children lack some or all of their recommended vaccines.” Peter Sandman, a risk communication specialist who consults with major companies to reduce outrage in the event of an accident or otherwise risky situation, would consider many of these parents to be “Risk Oblivious”. Because some of these diseases haven’t been seen in 30 or 40 years, they think it is then ok not to vaccinate against them because the risk of contracting one of them is low. The risk still exists, though, especially with the increase in international travel.

Countries around the world have different regulations for vaccinations, so it is not too far off to say that the United States could have an outbreak of a deadly disease at any time because someone brings it back home. An NPR radio broadcast, produced by *This American Life*, reported in 2008 that an unvaccinated seven-year-old boy from San Diego went to Switzerland with his family on vacation and contracted the measles while abroad. Not showing any symptoms until returning back to the US on January 15, he had exposed two siblings to the disease, which can be fatal. By the end of the breakout after everyone had been tracked, nearly 1,000 people had been exposed, 11 other children were diagnosed with the measles, and more than 73 had to be quarantined. Some states, including California, have personal-belief policies in
place, allowing parents to opt out of a vaccine for their child without penalty. The National Association of County and City Health Officials (NACCHO) has been urging officials across the country to remove the personal belief exemptions from state immunization laws and regulations. Little success has been seen.\textsuperscript{11}

Since the 2008 outbreak in San Diego, reports of the measles are becoming more common. From California, to Washington, Colorado, Indiana and New Jersey, small outbreaks are popping up across the nation. A 2013 outbreak in New York reported 58 confirmed cases of the disease, which prompted new vaccination regulations for the children in that area. The New York outbreak is the largest outbreak in the US since the endemic (naturally occurring) spread of the measles was eliminated. The general consensus in the scientific community is that if more skeptical parents vaccinate their children against the measles by using the MMR vaccine, these outbreaks would decrease.

Among other things, unnatural ingredients in some vaccines cause parents to worry. Vaccinateyourbaby.org, a website launched by the organization Every Child by Two (ECBT) as a campaign to raise awareness of the importance of vaccinations for all children by age two, says that such things as Thimerosal, formaldehyde and adjuvants (aluminum) can be found in vaccines as preservatives and stabilizers.\textsuperscript{10}

Thimerosal is at the center of controversy in many debates, including the link between autism and the MMR vaccine. An ethylmercury based preservative, it was phased out of vaccines in the late 1990s and early 2000’s to reduce mercury content in all environmental sources. Ethylmercury is different than methylmercury, however, in that it is expelled from the body
rather quickly instead of building up. Today, the influenza vaccine is the only vaccine that still contains Thimerosal, although a Thimerosal-free formula is available.

Diseases such as the measles, mumps and rubella are all threatening to young children who are not vaccinated against them, even today. The CDC recommends that infants be immunized with the MMR vaccine between the ages of 12 and 15 months, and again before they enter kindergarten (ages four to six years). Children are the most vulnerable victims of the diseases mainly because their immune systems are still developing, and oftentimes not strong enough to fight off the measles, mumps or a case of rubella.

**Autism, the MMR vaccine and the Andrew Wakefield study**

Autism and autism spectrum disorder (ASDs) are a group of brain development disorders. Symptoms of autism are generally seen within the early years of development between the ages of two and three. According to Autism Speaks, the world’s leading autism science and advocacy organization, the symptoms of autism include “Intellectual disability, difficulties with motor coordination and attention and physical health issues such as sleep and gastrointestinal disturbances.” Subtypes of autism include Rett syndrome, childhood disintegrative disorder, pervasive developmental syndrome- not otherwise specified (PPD-NOS) and Asperger syndrome. As of May 2013, these subtypes are classified as ASDs.14

In 1998, Andrew Wakefield, a surgeon and medical researcher at the Royal Free Hospital in London, published his study on the effects of the MMR vaccine in *The Lancet*, Britain’s most acclaimed medical journal. Through their study involving 12 children, Wakefield and his 12 colleagues claimed to have found a link between a bowel disease, autism and the vaccine.3
The paper began a media frenzy, which in turn caused many families to worry about the safety of the MMR vaccine. Did the benefits of protection from the measles really outweigh the risk to behavioral and developmental regression and autism?

After further research and testing, scientists could not replicate the results Wakefield had seen. Investigating into the nature of the study and the methods, it was found that Wakefield was practicing under severe conflicts of interest and had altered the medical histories of the children involved in his research. He was also suspected of malfeasance, subjecting the children to colonoscopies and even lumbar puncture.

*London Sunday Times* reporter Brian Deer investigated the case and found that Wakefield received excess of $674,000 from lawyers preparing lawsuits against drug companies manufacturing vaccines who had been hired by Allergy Induced Autism, a “U.K. based charity dedicated to identifying the underlying causes and biochemical effects of autistic spectrum disorders.” Today, due to inflation, those payments would be the equivalent of $965,311. Deer also reported that in 1995 Wakefield filed a patent application for a new measles vaccine of his creation. It was also found that Wakefield had plans to build a company of his own.

Following Deer’s story, he was invited by the British Medical Journal (BMJ) to investigate further into the so-called scandal. This series of articles seemed to prompt 10 of the co-authors of Wakefield’s publication in *The Lancet* to remove their names from the paper in 2004. *The Lancet* formally retracted the paper on February 2, 2010. Andrew Wakefield has since lost his right to practice medicine in Great Britain, but the outrage from parents who still believe there is some merit to the research into Thimerosal and the MMR vaccine’s link to autism is still here.
Media Effects

Following the publication of Wakefield’s report in *The Lancet* in 1998, parents around the world began to question the medical advice from their doctors regarding the vaccines their children receive. The retraction of the article put even more spin in the news, splitting the media in two; one side in support of Wakefield, the other against him. Some called Wakefield and his project an “elaborate fraud” while others argued that he was onto something that no one else in the scientific community wanted to touch based on the reputation of vaccines.

Six years after the retraction, in April of 2004, Wakefield and two colleagues, Peter Harvey and John Linnell, published “MMR—responding to retraction.” The response seemed to be an attempt to clear their names (and the air), disputing the information that, they felt, had been reflected incorrectly in the media, including some of the research biases that were found.

In the document, the men claim that any and all information that needed to be disclosed to *The Lancet* had been done so through the appropriate channels and emphasized that the publication “was not a scientific paper but a clinical report.” They also state that no Legal Aid money was used to fund the research, explicitly saying “There was no conflict of interest.”

The response also included discussion about the causal link between MMR and autism, saying, “The report itself was a description of the history as reported to us, and the relevant clinical findings. No claim of a causal association with MMR was ever made.”

The interpretation of the original retracted reports reads: “We identified associated gastrointestinal disease and developmental regression in a group of previously normal children, which was generally associated in time with possible environmental triggers.” Comparing this to the information in the retraction response, we can see that there is a definite disconnect, even
ever so subtly. Because of scientists’ difficulties replicating the results Wakefield had seen, uncertainly within the medical community was seen by the media as a lead to more controversy.

**Risk Communication Analysis**

Risks of vaccinations are communicated to parents in a number of ways, including pamphlets, posters and information sheets distributed during doctor’s visits. Through these methods, the potentially serious risks sometimes go unnoticed, either because doctors don’t explain enough or parents do not fully read the information given to them.

Because of the trusting relationship between a patient and their doctor, some parents may not entirely read the pamphlets; they may only scan them. A trusted source (ethos), the CDC’s MMR vaccine information handout states the symptoms of the measles, mumps and rubella, all of which have scary symptoms including brain damage and death. The vaccine itself, because it contains antigens of each of those diseases, *could* potentially cause those same symptoms. Though rarely, the risk is still there.

The CDC’s claim that vaccines can “put an end” to the serious effects of a deadly disease is a bit misleading. Many of the disease vaccines protect us against are not cures; they are only safeguards. Conflicting reports in the media led parents to question their trust in health officials and organizations. When the same issues are debated back and forth, with both sides preaching different stories and facts and backing them up with evidence, who are you supposed to believe? A failure of invariance results when inconsistent coverage, with either side not necessarily incorrect, is created. Choosing a side to back up or agree with poses a problem because you do not want to back the wrong side. With the failure of invariance in mind, I would like to apply Pascal’s Wager to the supposed link between the MMR vaccine and autism.
Pascal started by imagining a situation where the existence and nonexistence of God cannot be proved or disproved by human reason. Since you cannot determine a truth, you must “wager” by weighing out the possible consequences of your choice. In this case, the consequence is your child being diagnosed with autism or an autism-related disorder. An application of Pascal’s Wager in this situation appears in the following table:

<table>
<thead>
<tr>
<th>The MMR vaccine’s link to autism</th>
<th>There is a connection</th>
<th>There is not a connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belief</td>
<td>Proven, point validated (infinite gain)</td>
<td>Disproven, wasted time, etc. (finite loss)</td>
</tr>
<tr>
<td>Disbelief</td>
<td>Disproven, wasted time, etc. (infinite loss)</td>
<td>Proven, point validated (finite gain)</td>
</tr>
</tbody>
</table>

Based on the table, a parent’s belief that there is a connection between autism and the MMR vaccine would result in an infinite gain, meaning that all of the time and effort they put into research, support groups and defense of their belief has been validated. If there is not a connection, they have only experienced a finite loss (less extreme than an infinite loss). If a parent believes there is no connection between the MMR vaccine and autism, thus having their child vaccinated, and there is no causal link, they have achieved a finite gain. In the case of a parent who disbelieves the reports of a link to autism, however, who has their son/daughter vaccinated and their child is diagnosed with autism, they have experienced an infinite loss. Maybe if they would not have allowed their child to have the MMR vaccine, their son/daughter would not have autism.

Using Pascal’s Wager to weigh the options, do the benefits of the MMR vaccine (prevention of contraction of diseases) outweigh the risk of your child being diagnosed with autism? With both
sides of the argument and the studies discussed in this paper in mind, how would you go about making a decision?

The war against vaccines today

According to the Federal Drug Administration (FDA), epidemiological studies done in the US, Denmark, Sweden and the United Kingdom all rejected the causal relationship between Thimerosal-containing vaccines (including MMR) and autism. A more recent study, conducted by the CDC and published in The Journal of Pediatrics in the spring of 2013, compared the vaccine histories of approximately 250 children with ASDs with the histories of 750 typical children. The study looked specifically at the number of antigens each child received and whether that affected the risk of an autism diagnosis. The results were unequivocal.

Although hardcore anti-vaccine warriors may not be swayed by the new study, the CDC’s hope is that parents’ skepticism on the use of vaccines will decrease. By drawing focus away from the MMR vaccine and putting more attention on research into what actually causes autism, scientists hope to one day prevent or cure the behavioral regression disorder.
Sources