

Vaccinations: Uses and dangers in fighting disease

In a new global minded world with ever-growing health problems, we look for solutions that can effect a large group of people all at once. Vaccinations have therefore always been an interesting remedy for governments to invest in. Ever since the discovery of vaccinations against cowpox in 1796, by Edward Jenner, the global demand has never stopped growing. Although, vaccinations where first a matter of prestige for a country, it soon came to be a social security and part of the public health system. In the 19th century vaccinations against smallpox became compulsory under the systems of law in most of Europe and the America's. One century later came the development of vaccinations for infants' against the measles, mumps, and other diseases that threatened the health of our children. These infant immunizations eventually even became a requirement for children in the public school system.

In 1974, the United Nations in cooperation with UNICEF started the Expanded Program on Immunization (EPI). The main goals of this program are the dramatic increase of vaccinations rates among children in developing countries. Now more then three decades later, EPI has functioned through the WHO's regional offices to meet the target immunization rates for almost all diseases with a corresponding immunologic agent. The most famous and successful campaign so far, was perhaps the smallpox campaign in the 1960's and 1970's. This massive campaign terminated the last of the natural occurring cases of smallpox in Somalia and its neighbor country of Ethiopia. These cases are still brought forward to show the effectiveness of such programs, and the benefits that vaccinations have on global public health. For more than 50 years, private foundations such as the Rockefeller foundation, and in the last ten years the Bill and

Melinda Gates Foundation, have supported these programs and promoted them in the international community. One of the big benefiterers of this international support is the ongoing vaccinations program in central Africa to fight malaria, HIV, hepatitis, and other transmittable sexual diseases.

Although there are a lot of benefits to such ways of medicine, the anti-vaccination group has rapidly expanded since the start of the first vaccinations. However, we do have to realize that in Jenner's era, modern quality control of sterilization and germs was not yet applicable. All drugs now are created in laboratories with very high and strict safety standards, so why are people still afraid? Most drugs we know are chemical agents; meaning that they are built-up from chemicals, and once they become finished medicine, are not subject to mutation or degradation. For example an Advil pill can safely travel from point A to point B without it changing its chemical make-up. On the other hand are vaccinations; known to be biologic agents, these biologic agents are often viruses with a biological molecular structure that can change during processing. Whether it is a one-cell-virus, or a bacterial-virus, all these structures can be disturbed at several points from the laboratory to the moment it's presented to the patients.

Do to concerns like these, the WHO has put forth a very strict monitoring process that, to no one's surprise, has been internationally accepted and applied to every person invested in such branches of medicine. The vaccine should meet the quality requirements as defined in the current WHO policy statement. The medicine itself needs to be regarded as safe, and have a significant impact on the actual disease in all targeted populations. Of course the vaccine should not be able to interfere with the immune response system of the patients, but that goes for all medicine.

Even with such strict measures accidents do happen, but due to good research and making the vaccine able to cope with the technical limitations, molecular change seems to be circumvented. For example, in the Sudan were doctors where forced to use vials for patients that have been intercepted by militia, and has not been given back for many years. Obviously the concerns about these given vaccinations only came out when the harm was done, and supervision was not possible anymore. These types of cases are only known in developing countries, and do not apply anywhere else in the world. By trying to keep complete control of production and distribution, the WHO is trying to ensure safety for every patient.

Global threats to public health today are mainly kept in control by the vaccinations programs set up by most western governments. But how do they differ from each other, and why? Private medicine companies are the ones who develop the vaccinations; distribution and general information about the product are not always transparent enough for the people who take it. For example, when the H1N1 anti-virus was first introduced. A private company developed the original anti-virus, and when it first hit the market it made some people very sick. There were also problems in meeting demand and replenishing stocks of the vaccine. Even though this only happened to a very select group of people, the information that was given about the product was just not transparent enough on who could, or could not receive the vaccination. This created a massive global scare towards vaccinations and their safety. How did this go wrong with such strict regulations? Eventually a European Union sponsored company put forth a safe vaccine that was distributed properly, and was clear on what types of patients should

receive the vaccinations. However, this is an expensive medicine so the distribution to under privileged regions on the globe seems to be out of reach.

Protesters against the vaccination procedure even argue that we might not have needed a vaccination program for the H1N1 Virus. However, we should not forget that in a lot of cases the effectiveness of a vaccine is underestimated and maybe even under appreciated. If we look at the flu-vaccine shortage in the fall of 2004 in the United States of America, facts have shown that even a simple case of the flu can cause pandemic flu outbreaks when there are not enough vaccines for the people. Thus far, millions of lives have been saved because of these measures, and have made us capable of fighting off life threatening viruses that are still out there.

On January 12th of this year, a major earthquake struck the island of Haiti. This has now left us with a major international crisis. A fast foreign aid effort is struggling to meet the survivors' needs. At least 170,000 have died, and millions were affected, causing public health to drop below the point of humane. Conditions in the refugee camps have deteriorated, and it has rapidly become a place for infection and disease to spread. The WHO together with UNICEF, the Haitian Ministry of Health, and other international foundations have organized the immunizations drive to reach every effected person in these refugee camps. Even though this campaign is mainly focused on infants, there are several vaccines available for older children and adults. These vaccines will secure a large part of the population from diseases such as diarrhoea, measles, tetanus and diphtheria.

Since this major disaster struck, the infrastructure of the country is destroyed, left hundreds of thousands misplaced, and therefore the health of the entire population is at

risk. Without the proper means to reach every part of the affected area, it seems that unstable biological-agent-vaccinations become more of a risk to distribute than their potential good. With this type of criticism towards vaccinations, what can countries suggest as an alternative? It is imperative for us as an international community to act. What would be the proper response if the safety and distribution of vaccinations seems to create so many problems?

One thing seems clear; without vaccinations humanity would have to struggle with massive outbreaks of diseases. The fact that they have saved so many lives in the past will almost guarantee that it will keep doing so in the future. It seems almost unimaginable to live in a world without them, and it would not be wise to do so. However, the dangers that are attached to this form of medicine are still far too great to be able to call this a safe way of combating disease. This might be overcome with the proper research and funding from the international community, but too many countries still see a problem with these types of medicine and resist so long as there is no safety guarantee.

- What is your country's standpoint on vaccinations, and why have they taken this point of view?
- Does your country effectively use vaccinations, or are other health systems set up in your country that focus on other treatments?
- Can the international community cooperate in an exchange of information about diseases and the cure there of?
- How can we effectively distribute vaccinations to people beyond our own border?

- How can we be more involved in Haiti, and should we keep sending more vaccinations for children or should we focus on adults who can rebuild their economy?
- How should we respond with vaccinations, should it be the first thing in the effected area or should we focus more on other types of medicine?

Websites:

- http://www.who.int/immunization_delivery/en/index.html
- http://www.who.int/vaccine_research/en/index.html
- <http://content.healthaffairs.org/cgi/content/full/24/3/611>
- <http://www.directrelief.org/>

WHO pandemic protocol and member states compliance

In the last few centuries, several pandemics have hit the globe. If we think back about one of the first major recorded ones, we think about the black plague that struck Europe in the early 14th century. The virus was spread by rats and due to poor hygiene most people did not stand a chance. Millions died, and the population of Europe was cut in half. Although pandemics are very infrequent events, they can spread very rapidly and will have an effect on the entire population of the initial outbreak zone, and often even on the global village as well. This can result in millions of lives that are lost, and will disrupt the social and economic base of that country well beyond the point of the absolute impact on health. SARS was known to be the first influenza pandemic of the 21st century, thousands died and the virus was able to spread all over the world. In response to this, we have tried to put our focus on predicting a new influenza pandemic event. Such predictions have been unsuccessful thus far, but through international compliance the WHO hopes to push forward on this investigation.

In 2006, most parts of Europe were affected by an influenza pandemic of the H5N1 virus. This is more commonly known as the avian virus, or bird flu. It was able to spread throughout Europe because it was the season for the birds to migrate to a warmer place, and thus spread the bird flu across borders. The biggest scare was that it might be able to affect humans as well, and thus vaccinations were prepared to give to the people that were affected, most of which were farmers in the countryside. Within several days of the outbreak of the H5N1 virus, two primary strategies were implemented to focus on the current events taking place, and the associated pandemic risk, however a third was added on later in order to make the first to more efficient.

The first strategy focuses on reducing the opportunities for the virus to spread. This consisted of locking up all private owned birds, and destroying any of the affected animals. By doing so, we would be able to protect livestock, and effectively reduce opportunities for the virus to spread to other countries, and thus reducing the risk for humanity. This strategy was implemented immediately, simply because this would only be effective in the early stages of such a pandemic threat. In the long run this seems to have helped keep down the number of infected birds in the wild. This rule is now still implemented as the first rule for farmers to implement during a pandemic.

The second strategy was to intensify the global preparedness to cope with such a pandemic, nationally as well as internationally. Such plans existed, but focused more on diseases spreading through humans instead of animals. By creating a national preparedness plan, the WHO communicated that pandemics can be kept under control if we act on it in early stages. This plan consists of several major points that had to be improved; for instance, improving access to antiviral drugs, making it possible for a quick response in case of a pandemic alert. Also countries should, in a combined effort if necessary, develop influenza pandemic vaccines and tactics for increasing the accessibility and pushing down costs. To help create an international early warning system, a series of communication plans and alert messages have been developed and are already in use today in pandemic protocol.

The third strategy, which was added on later, focuses on the international coordination of planning and resources. This would make it possible to rapidly detect, contain, and reverse such pandemic outbreaks. The added purpose to this would be to create a common standard, so we can swiftly act when symptoms are detected, and

effectively respond to an emerging pandemic virus before its able to spread beyond the initial outbreak zone. Never before has there been such an advanced set-up warning system, and although logistical challenges are there, the WHO believes that this can change the way we can deal with pandemic outbreaks.

These strategies will also lead to more responsibilities for every country, making sure that every state can be ready in case of an emergency. Individual countries are responsible for conducting surveillance to screen for signals that a virus has the potential to become a pandemic. These signals, which would be integrated in the international communication plan, will include the identification of a virus with certain genetic features and molecular structures. The International Health Regulations require a country to report a case within 24 hours of discovery. Upon notification, the WHO will be able to rapidly assess the situation, and will give recommendations on how to act and respond in the proper way.

These primary responsibilities for countries go beyond only these criteria. A country itself should be able to respond soon after discovering such an outbreak. By mobilizing their own ground staff, in conjunction with the compliance of their own national legal health requirements, containment of an outbreak is possible. Surrounding countries are also responsible for providing support to the outbreak zone, and additionally surrounding countries have to also declare a state of emergency and act in the way that is agreed upon. However, it is imperative for the WHO to help coordinate all containment activities in the effected country. Not only does this bring valuable expertise to the problem, but it also allows WHO to observe and improve their international pandemic response plans.

Last year, 2009, we had another major influenza pandemic outbreak of the H1N1 virus. This virus, from which a related DNA-train had only once before circulated among humans in 1918, is not related to any previous or current seasonal flu. So, unlike the seasonal influenza, the “new” virus is one where most people have little to no immunity for it. The WHO realized how this virus can affected the entire globe and that the pandemic response plan should be implemented immediately. Within a week after the outbreak first went global, the WHO had enforced its strategies, and was talking to every major world leader about the concern. A global consultation was held to discuss the elements needed to fight of this global scare.

The WHO has released several plans to governments across the world, as well as to the people of our globe. Simple tasks where given to households, such as properly washing hands on a regular basis and using handkerchiefs when coughing or sneezing. On a global scale however, the WHO was trying to get vaccinations ready for deployment in the affected area’s. However, since it has been a while since this virus circulated, it took sometime before the cure and immunization where ready.

Due to a well-structured monitoring system, it was possible to trace the virus and supply support in the initial breakout zone. However, this virus seems not contained in some parts of the world, so the initial threat remains. International Health regulations did make it easier to discover such outbreaks, but without international cooperation on response it seems to not be able to work in full capacity. The WHO has tried over the years to set up a well thought through plan to keep outbreaks from going global. Every pandemic event seems to create the need for adjustments to make the plan more effective. International compliance to these plans has been appreciated, however pandemics will

continue to occur. It is important for the international community to come together as one to fight off diseases. Through international scientific cooperation, we should be able to create a global response plan under guidance of the WHO. If we're able to set up such a communication system, we would not only be able to handle situations better but it will lower the costs for the actual remedy itself.

- What are the WHO strategies for the H1N1 pandemic protocol, and how is your country involved or affected by it?

- How can the international community come together on this, and what would your country be able to contribute?

- How is your country prepared, did they create their own preparedness plan for pandemic influenza?

- How would the WHO be able to work more efficient on research and distribution of aids?

- How is the WHO treading the possible pandemic outbreak of diseases in Haiti?

Websites

• http://un-influenza.org/objective_3

• <http://www.who.int/csr/disease/en/> - -

• http://www.who.int/csr/disease/swineflu/guidance/national_authorities/en/index.html

Industrial chemicals and the effects on human health

After the industrial revolution the production of goods that benefitted mankind, technologically and biologically, skyrocketed. The post-World War II chemical revolution only contributed to that production of sustainable benefits for mankind, and chemicals initially created many benefits, such as herbicides, pesticides, lubricants, cooling agents, and more that raise the standard of living around the globe. The chemical revolution even affected our food production, for instance; in the way we look at crops, use crops, and how we produce crops. This way of manipulating the crops made food production much more efficient, and even enhanced the world's food supply. It appears that a significant portion of the gross domestic product (GDP) in many countries resulted from the chemical industry and its products during that time period. These products contributed to the quality of life, and caused growth in the use of industrial chemicals in households.

However, this has not come without a cost, and the dangers to the environment and human health have also increased dramatically. On December 3rd 1984, in the town of Bhopal in India. A pesticide plant leaked more than 40 tons of methyl isocyanate, gas and other extremely dangerous toxins, instantly killing at least 3,700 people and resulting in exposure to dangerous gases to at least half a million people. 25 years after the catastrophe, almost 400 tons of toxic chemicals are abandoned at the plant, and are still polluting the ground water in Bhopal, which affects the water storages in the entire region. Lawsuits continue to this day over who is responsible, and the site still poses a continuing health hazard for the biological environment in that region.

Some chemicals that have improved pest and disease control have a negative affect on the human health and the biological environment. Persistent Organic Pollutants, or POPs, are chemicals that remain in tact for a long period of time, and that can very easily spread geographically. POPs can accumulate in fat-tissue of any living organism, and are highly toxic to humans as well as wildlife. DDT is probably one of the most famous, and controversial pesticides ever made. An estimated 4 billion pounds of this chemical have been produced and applied worldwide since 1940. In the United States, DDT was used extensively on agricultural crops, particularly cotton, from 1945 to 1972. DDT was also used to protect soldiers from insect-borne diseases such as malaria and typhus during World War II, and it remains a valuable public health tool in parts of the tropics. The heavy use of this highly persistent chemical, however, led to widespread environmental contamination and the accumulation of DDT in humans and wildlife.

One of the most common concerns about chemical accidents, hazardous material spills, or short-term toxicity, is that the toxins can often spread easily through groundwater, polluting a larger area. The WHO response is often to send help to the affected area, however without international cooperation in such an event it becomes impossible to get full control of the situation. When the weather is not on our side either, there is even a chance the whole continent can be affected. With a national and international response plan, the WHO hopes that countries can learn from each other in dealing with such chemical disasters. Countries also have to be ready if one of their neighboring countries is dealing with such a disaster, that the people are informed and can get to safety.

In 1995 UNEP began to investigate the implications of POPs, starting with a group of 12 key POPs, these POPs are better known as; “the Dirty Dozen.” Six years later, in May 2001, ninety-one countries and the European Union joined forces to sign a treaty to reduce or eliminate the production, use, and/or release of these 12 key POPs, and to review the use of other POPs chemicals in our global village. The signing of this treaty is better known as the Stockholm Convention. Most of these “dirty dozen” are not manufactured or used anymore in US or other countries. However, although there are regulations, there is no complete ban on PCBs or dioxins. This is because these chemicals are often byproducts of manufacturing and energy production, and not of the intended product itself.

POPs work their way through the food chain, by accumulating in body fat, these POPs become more and more concentrated as they move from one creature to the next, this process is known as “biomagnification”. When concentrated contaminants are able to settle, even in small amounts, in the smaller animals in the lower food chain, it can have significant negative affect on the larger predators whom are on the top of the food chain. POPs have been linked to damage to the reproductive, neurologic, endocrine, and immunologic systems as well as to adverse effects on behavior and development. People are mainly exposed to POPs through contaminated foods, drinking contaminated water, and/or direct contact with the chemicals. In people, as in wildlife, POPs can be transferred through the placenta, and breast milk to developing offspring. The worst affected groups are the ones whose primary diet consists of fish. Fish can carry POPs for generations, because of their high fat percentage. Since chemicals can travel so easy in

water, it seems almost impossible that it would not affect our creatures of the sea. People in Arctic regions have been most severely affected.

Since the ban of the “dirty dozen” a number of POPs have been added to the list. The POP Review Committee is an institution for submitting and approving new chemicals. They review chemicals that are proposed for a listing, and are a subsidiary body to the Stockholm Convention. This review committee is part of a larger global monitoring plan that also contains a global response effort in case of a large-scale chemical emergency like we had in Bhopal. First, emergency response personnel on the ground should assess the risk of the situation, and measure the concentration of chemical in the effected area. Second, the government should then take the appropriate measures to clean up the affected zone, and then alert the international community. A wide range of systems have been designed to deal with chemical spills. The WHO supports research for the highly innovative bioremediation, where bacteria are used to metabolize the contaminants. Also there is research on the use of oxidants to break chemicals down, called chemical oxidation.

The WHO has always tried to look for common grounds between countries in case of a large-scale emergency, or even in case of smaller affected areas. The increase in global demand is pushing our world to one that forces us to put our health at risk. Safety regulations have to be tightened, and there should be more control on plants of any sort that carry or produce hazardous material. Plant design could be made safer, in some cases by operating at lower temperatures and pressures. Chemical plants could also be made safer by mandating that companies have their own large-scale technical response team which would be capable of deploying extra medical personnel, and warning the

people in the effected area. The international effort to improve safety on plants, and other factories that use toxins, is an ongoing process. The pressure of the nuclear aspect makes it hard for some countries to open their doors for foreign inspectors or diplomats. Even when they want to share information it becomes a complicated international matter.

There is additional concern that the industrialization of Asian countries may only increase the prevalence of POPs in the atmosphere. Since we now know that combustion is one of the leading caused of dioxin and PCBs, we should focus on clean ways of creating energy and transportation. Only by putting our focus on renewable goods, and energy production, can we truly make a difference. An advisory committee to the Stockholm convention is pushing to eliminate all of the POPs by 2018. The WHO is pushing for international cooperation and the compliance of member states to realize this ideal, so we can force humanity in a more safe and secure path that benefits our next generations.

- Has your country accepted and ratified the Stockholm Convention? If not, what are the impediments?
- Is your country a major polluter of a particular POP?
- Is your country particularly affected by this pollution? Is this issue being addressed seriously within your government?
- What are the side effects of this kind of regulation? Are there anecdotes or studies that have shown these regulatory efforts are harmful?
- In what ways can your country contribute to the process of eliminating POPS?

- Some POPs were created to benefit society, if they are no longer in use, what has replaced them? Are the replacements healthier, or have we simply passed the problem on to someone else?

Websites

- <http://www.who.int/iomc/groups/pop/en/>
- http://ec.europa.eu/environment/pops/index_en.htm
- <http://www.epa.gov/international/toxics/pop.htm#pops>
- <http://chm.pops.int/Convention/tabid/54/language/en-US/Default.aspx>