Poliomyelitis, Yesterday, Today and Tomorrow, Almost at the End! Rotary’s Fight for the Health of the World’s Children  by: John Dugaw MD

Polio, poliomyelitis, infantile paralysis, are all the same disease. I want to give you a brief overview of the devastation polio has caused in the developing countries, a bit of information about the virus itself—our fiendish arch enemy, how use of vaccines prevents the disease, complications of the vaccines, and how Rotary got started in their Polio Plus program and eventually partnered with the World Health Organization and the Gates Foundation. What can Rotary do in the future to fight polio as the task becomes more technically, politically and biologically complicated? I think it is really exciting to see where we have been and the future had some clouds on the horizon that seem to be clearing. We are going to eradicate Polio!
Polio’s damage was ignored in the developing world for a long time, because epidemic polio was considered a disease of wealthy countries. In the 1970’s, however, lameness surveys in 20 undeveloped countries of school age children showed lower limb paralysis rates of up to 11 per 1000 children. This was much higher than the peak rates of paralysis in the US during the most vicious epidemics. Polio was really a world problem and not because it killed children but because it crippled them and made them the outcasts of societies that could barely feed themselves. These children lived but they and their families had little hope. Rotary Polio Plus includes programs for treatment and surgical correction of polio deformities for these children and vocational rehabilitation. Children and families were given hope but still the disease went on to maim and kill. Look at the numbers of cases from 2010. Today only Afghanistan and Pakistan have Wild type polio virus circulating. Pretty impressive effort!


There are three strains of polio virus, prosaically named Type 1, 2 and 3. Type 2 has been eradicated; no wild case of Type 2 polio has been seen since October 1999, Type 3 has not been seen since 2012. Because of this, we know polio can be defeated! The new monovalent (one type of polio virus only) and bivalent oral vaccines for Type 1 and Type 3 are 10 times more effective than the old trivalent (contains all three types) polio vaccine. The virus in the oral polio
vaccine is alive, it causes non-paralytic disease in the vaccinated person, which causes the person to develop antibodies to polio in their gut and blood which will kill the wild polio virus. This is what we are using today in the National Immunization Days in countries where polio remains a problem. In developed countries we are using injectible polio vaccine containing dead virus of all three types. It cannot cause polio and the person does not become ill from the vaccine. It protects well to paralysis, although sometimes the person will catch the wild virus and actively excrete it in their bowel movements and be infectious to others, but the vaccine protects the from paralysis. The cost for a dose of the oral drop vaccine to UNICEF is inexpensive easily administered by any lay person. The injectible vaccine costs UNICEF over three dollars and requires a trained person to give the injections, syringes, etc. Obviously it is most cost effective to give the oral drop vaccines. Unfortunately, when wild polio viruses are eradicated from an area the live vaccine virus can evolve and mutate and again cause paralysis. This is because unimmunized children have no intestinal immunity to the polio virus and after it has passed from child to child several times not causing disease it can change genetically and cause paralysis in children with no immunity. A child from the US immunized with only injectable polio vaccine could go to Pakistan, catch the wild virus, not get paralyzed but come back to the US excreting the polio vaccine virus in their stools, thus exposing unimmunized US children to risk.
No vaccine is free of problems and the trivalent oral polio vaccine was causing more paralysis cases from the live polio vaccine virus in developed countries that were being caused by the wild polio virus. Any cases of vaccine caused polio in a polio free country is too many. The Philippines recently reported two cases of polio from the Type 2 vaccine virus in a very remote area. This is why developed countries switched from the oral vaccine to the injectible polio vaccines in 1998. Some day, as we back polio into the corner and the last cases are gone we will have to use injectible vaccine to prevent outbreaks in what are now undeveloped countries and that will be expensive with our current vaccine technology. But there is new research, since parents like the oral vaccine-- babies don’t cry, easy to give-- the injectable vaccine needs a painless easy way to administer it without a needle. The military has been giving all sorts of vaccinations for years using a needle jet gun that “shoots” the vaccine through the skin, but this is a very expensive technology, has all sort of disinfecting issues and needs electricity. In June of 2010, a study in Oman was published showed that using several different devices, injectable polio vaccine doses could be reduced to 20% of the usual dose and children would develop very good immune responses to the vaccine. The devices inject the virus in to the skin; it is painless and well accepted by their families. Unfortunately, the devices are still in development and not approved for use except in research. Which is needed to safely get these devices into everyday use when we need them in our polio battle. The price for the vaccine then can go down to about 60 cents a dose. More affordable than over three dollars. We have obstacles with solutions that seem to arrive just in time.

When in 1980, Rotarians dramatically reduced wild polio cases in the Philippines, it became obvious that polio, like smallpox could be a disease of the past. Since then countless Rotarians have carried polio vaccine to places only a local Rotarian could know, keeping the vaccines cold and giving them to the children of people they may have known already in their own communities. Rotary’s amazing ability to “get it done” on the ground has the major reason for the success of the Polio Eradication program in the past. But we needed help. The trivalent vaccine was not strong enough to break through the intestinal immune systems of children in developing countries who have many more parasites, bacteria, worms, and viruses harbored in their guts than children in developing countries. All of these infections competed with the polio vaccine for the attention of the child’s immune system. This was dubbed “the Slumdog” syndrome by Dr. Lee Harmon who is the Polio Plus Chair for RI District 5050. If you have seen the movie “Slumdog Millionaire”, which was filmed in India, you will remember the little boy who falls into the outhouse. As Dr. Harmon noted after his trip to India, he saw lots of drinking water running right next to open sewers. Imagine the intestines of the children who live in these conditions. Very tough kids, but very tough environments for the polio vaccine virus to get noticed by the child’s immune system.
Rotary’s role in the fight against polio will remain that of a “swat team” providing manpower, money and vaccines for sudden outbreaks, basic ground troops for National Immunization Days. Our members come from all over the world to support the local Rotarians, local government people and converge on these sites to vaccinate, support, and be a presence. Just being there, coming at great expense from across the world demonstrates to the local Rotarians, and the local people and officials in local government how important this fight is to everyone, everywhere. We are like cheer leaders in a very difficult game against a very slimy, constantly changing viral opponent. Because we are there, it is important. It is important that is why we are there.

Rotarians will continue to help solve political problems in the remaining polio endemic countries. When Nigeria had a large number of cases of vaccine refusal cause in part by religious concerns it was the Rotarians that point out that the vaccines were made in Indonesia, a predominantly Muslim nation. I talked with a Rotarian doctor from Nigeria who is also a health officer and he told me that Rotary actually took some religious officials with concerns to see the factory in Indonesia where they were hosted by local Rotarians, who were Muslims. These officials dropped their opposition to polio vaccination. It is a great story of how Rotary can get stuff done when no one else can. Today, Nigeria has been polio free for 3 years.
So we still have an uphill battle against polio. Pakistan and Afghanistan have political, geographical and religious issues surrounding the polio vaccine programs, and the current plan outlined in last month’s Rotarian magazine is for a regional hub for these two countries to consolidate our efforts and hopefully give more ownership to the local governments. India built a robust public health system to eradicate polio and now is using the same system to destroy measles, tetanus and other vaccine preventable diseases. Hopefully, giving a solid local focus with the “center” will increase government responsiveness in Pakistan. Because the virus will change about 1% of its genetic code per year we need to continue to vaccinate 450 million children in 50 countries and we have to get the vaccine to the kids before the virus develops resistance. Thanks to our partners in this fight we check for polio virus in the outgoing sewage of a city and monitor sewage samples in 34 countries to act quickly to avoid a major outbreak. We also have to investigate over 100 cases a year of paralysis each year to rule out polio as the cause. Our partners have also developed strong new vaccines as the trivalent vaccine has become less effective. We have good promise that when polio is gone we can keep it gone with new tools for administering the injectable vaccine. Rotary’s role will remain as foot soldiers in the fight and no one is better at it than we are. Our partnerships with the World Health Organization, national governments, and the Gates Foundation will give us the weapons, spy networks and numbers to do the job. A polio free world will save the global economy $40-$50 billion in health costs within the next 20 years. We have to count to know when we see the last case. It will be soon. Obstacles that 6 years ago seemed impossible to overcome have been defeated. Africa appears to be on the road to being polio free in spite of significant political disruption. We will eradicate polio.
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