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Comment

Networking at global and community levels for control of diseases

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Introduction

The world is facing an unprecedented situation in health management as fast transport and travel lead to spread of diseases at a rate that has not been seen before and into countries that had once conquered them. This is even more evident with infectious diseases which do not respect geopolitical barriers or economic progress. It is becoming increasingly clear that control of such diseases and good practices for public health need global sharing of knowledge and international cooperation. In addition networking of institutions involved in health care with the communities that they serve is fundamental to containing diseases and promoting good health. For reasons as yet unclear even non infectious diseases such as obesity, hypertension and diabetes are also increasing at an alarming rate globally. The advantages of international networking and timely communication which contained three diseases will be discussed in this article.

SARS (Severe Acute Respiratory Syndrome) virus connects the world

SARS was the first new disease of the 21st century. It is now clear that the earliest case was that of a businessman who reported with atypical pneumonia on 16th November 2002 in the Guangdong Province of China. Due to lack of awareness many people died in China. SARS spread to the rest of the world when one of the infected doctors from Guangdong checked into Room 911 of Hotel Metropole in Hong Kong on February 21st 2003. At least 14 people who stayed at this hotel carried the infection to Toronto, Hong Kong, Vietnam and Singapore leading to large outbreaks in these countries. It was not till March 12th when the World Health Organization (WHO) issued a global alert did the world realize that a new disease had been born which was spreading fast and killing people. By July 2003 a total of 8,439 cases had been diagnosed, 92% in China, 3% in Canada, 2% in Singapore and 1% in USA and 25 other countries. 812 patients had died by this time.[1]

The initial reaction was that of panic with newspapers and television pictures showing people wearing ineffective masks, airline pilots refusing to fly to some countries and prediction of economic doom for Asia. Why did the public react in this manner particularly when seen in the context of diseases like influenza which kill 20,000 people every year? It was the mystery element that shocked the public and the health officials as the pneumonia was unusual with lungs appearing white on X-rays, people with close contact such as nurses and relatives were infected in a short time and the causative organism had not been seen before. It was not till alerts were issued about the early symptoms of the disease and the protective measures to be used did the panic subside to some extent. Good detective work by the epidemiologists in the various countries led to tracking and isolating of people exposed to infection. Health personnel were the most vulnerable people and it was realized in Canada that the respirators used for the patients released infected droplets into the environment of the ward. This realization led to institution of better protective procedures that saved lives.

The story of SARS is a fascinating example of the power of networking and international cooperation at its best. The infective agent was identified as a new virus of the corona virus family.[2] Table 1 demonstrates the speed with which events occurred from the first case report, to defining the clinical

picture,[3] identifying and sequencing the virus. A diagnostic based on the genetic code of the virus was prepared in less than 4 months through research efforts in a German laboratory and distributed to 150 laboratories.[4] The receptor for the virus, the crystal structure which could be a drug target was worked out by researchers from different parts of the world. Soon the 3C like protease was recognized which initiated the National Health Research Institute of Taiwan to inhibit the virus growth by medicines used for influenza and clinical trials on a vaccine have been approved by China this year.

Amazingly, SARS was contained within 9 months of the first WHO alert. Though the last case was formally notified in April 2004 in China yet most of the epidemic was over by July 2003. The major factors for success were good global communication and networking initiated by the WHO between physicians, researchers and public health personnel with daily alerts on its website. Coordination of government machinery to screen for suspected cases at airports limited its spread. Most importantly, communicating with the people through public media such as television, radio, newspapers and pamphlets reduced the panic and facilitated information on protective measures to be taken, including the eating of exotic animals.

Could the situation have been further improved? China's reluctance to formally acknowledge the early deaths till April 2000, led to a 5 months delay in investigations and preventable deaths. Progress was faster once China went the extra mile and shared all its clinical knowledge and patient material with international groups. The link between Guangdong doctor's visits to nearby Hong Kong was also not made in time. Moreover, due to political or other reasons Taiwan was not assisted in time leading to more preventable deaths. Thus making partnerships work for health is essential for containing infectious diseases.

Table 1: Chronology of events associated with identification and control of SARS

Date	*Events*
16th Nov 2002	Early cases in Guangdong Province, China
21st Feb 2003	Infection through visitor from China spreads SARS from a Hong Kong Hotel leads to out breaks in Hong Kong, Canada, Vietnam, Singapore
15th March 2003	WHO alert, CDC telebriefing, Virus infection of kidney cells. Corona virus suspected
26th March 2003	RT-PCR based diagnostic test distributed to 150 laboratories.
4th April 2003	China apologizes for delay in notification of deaths due to SARS
7th April 2003	SARS confirmed in 17 countries
15th April 2003	Virus sequenced in less than 4 months
4th June 2003	WHO removes alert from Singapore, Beijing and Hong Kong as no cases had been reported over 20 days period.
5th July 2003	WHO announces the end of the epidemic as the last chain of human transmission was broken and removes alert from Taiwan and China.
April 2004	Last case reported from China
Aug 2005	China approves clinical trials on Vaccine

Polio Eradication, "The Beginning of the End; Target 2000" now pushed to 2005

Polio is another disease caused by a virus which targets nerve cells and leads to irreversible paralysis. Polio affects only man and therefore if transmission in humans is broken the virus would be eliminated from the world. At its peak, polio paralysed and killed up to 0.5 million people every year. 1 in 200 infections lead to paralysis of which 5-10% ended in death. The Salk vaccine was available by 1955 and the oral Sabin vaccine followed soon after and is currently the favoured one as it is safe and only 2 drops need to be given by mouth.

On May 31 1988, the World Health Assembly consisting of 192 countries agreed to eliminate polio by the year 2000.[5] At this time 125 countries were harboring the disease and 550 million children, less than 5 yrs of age were vaccinated in 82 countries. By 2003, transmission of polio was reduced by 99%.[6] Americas were free of polio by 1994, West Pacific regions by 2000 and Europe consisting of 51

countries by 2002. Four billion US $ have been spent to date and yet 7 countries including India, Nigeria, Egypt, Pakistan, Afghanistan, Somalia and Niger are endemic for the disease.

Nevertheless, this is a success story and as pointed out by Kofi A.Annan "the Global Polio Eradication Initiative is a shining model of how we can come together against a common enemy of mankind".[7] It symbolizes not only the strengths of communication and cooperation both globally and locally but also emphasizes how success is not achievable in spite of the best technologies and political will unless the people are convinced and made partners to such efforts. India is a good example to profile. The Polio Eradication Initiative was a cooperative effort of WHO, UNICEF, Rotary International, Centre for Disease Control (CDC), USA, many Non-governmental Organizations (NGOs) and national governments. Its aim was to immunize every child under 1 year at least with 3 doses orally, give pulses of vaccination to older children, flood the country with vaccine on special National Immunization days, have surveillance of paralysis to track possible reservoirs of infection and finally mop up the last reservoirs and break transmission by house to house, child to child immunization/check up. India instituted all these measures and tried to reach every child in remote areas, put in place Medical Officers for Surveillance, additional Medical Officers at community level and 8 referral laboratories to diagnose the virus from stool samples. In an unprecedented and historical move in December 1997 India immunized 125 million children in one day, and subsequently in January and March. This was done by planning well ahead for not only obtaining the vast number of doses required, maintaining the cold chain required to preserve the vaccine in a hot country but also involving every strata of society in a large country.

Providing information and communicating with the public were a key factor in the Eradication Programme. India did this through public media, schools, colleges and house to house visits. Everyone from politicians, government personnel, local governance councils, teachers, children, priests, house wives, socialites, film actors, sports persons and other celebrities were inducted in a war like situation. Street plays, puppet shows were undertaken in villages. Even elephants helped to inform the public by carrying billboards and loud speakers.

By June 2004 the number of polio cases had reduced to 13. Most of these were limited to 2 of the poorly administered states of the country. The case numbers may appear small in a country of over a billion people but it is taken as a danger signal since it indicates that transmission of polio has not been broken. What went wrong? It would appear that in spite of daily exhortations of celebrities on television to attend the pulse polio clinics and give 2 drops of the vaccine to their children, some people continued to be unconvinced. This was again an example of lack of communication. Part of this has been traced to poverty and illiteracy and part to the misconception that the vaccine makes the children unfertile. Some religious leaders also instilled fear that the vaccination was aimed at reducing the numbers of a religious community. Scientists also argued as to whether killed vaccine should have been combined with the oral one to counter the high density of the wild virus in a country with a large population of children. In spite of these arguments India is poised for a historical moment for eliminating polio, even though it missed the target of 2000.

Similar fears about polio vaccination appear to exist in the other countries as well. Nigeria reported 257 paralyzed polio children in 2004. More worryingly polio is also spreading to neighboring countries from Nigeria. Sudan which had been free of polio for the past 3 years reported an imported infection in a child. Nigeria is predominantly Muslim in the north and Christian in the south. Some Islamic religious leaders alleged that the oral vaccine contained hormones that would make girls infertile, thereby leading to poor acceptance of the vaccine and suspension of the campaign in 2003. This happened in spite of the fact a Nigerian was President of the Rotary International, a strong partner for polio eradication. Some hope is in the horizon as it is reported that the Islamic religious leaders have agreed to accept polio vaccine produced in Indonesia, a sister Muslim nation. On 9th February 2003 alone 165 million children were vaccinated over a six day period, involving 1.3 million teams and 200 million doses of the vaccine. $ 4 billion have already been spent on polio eradication and a further $75 million are required for 2005. The operational and economic costs of such vaccination would have been better served if misconcepts of a few people had been removed by dialogue. The target of polio eradication has now been pushed to end of 2005. Incidents such as these underscore that partnerships with the local communities is as important as that of global agencies if the advantages of the latest technologies are to make an impact on disease eradication.

Table 2: Polio Eradication- Importance of International Partnerships

International partners	
World Health Organization UNICEF UN Foundation	UN
Centre for Disease Control, USAID	USA
Canadian International Development Agency	Canada
Cooperazione Italiana	Italy
CORE (CGPP)	USA
Danida	Denmark
Department of International Division	UK
Japanese International Cooperation Agency	Japan
World Bank	
Gates Foundation	USA
National Governments	

Leprosy, elimination of a Biblical disease

If SARS is the newest disease of this millennium, leprosy is an ancient one vividly described in the bible and in other ancient texts of India such as the Susruth Samhita of 6 BC. It is caused by a bacterium which has a predilection for human skin and nerves and cannot be easily transmitted to animals. Till recently leprosy patients faced intense social stigma, the word “leper” is even now used as an epithet for a despicable person. In the sixties the world had 4.5 million patients most of whom were limited to the tropics and the low income countries and placed in secluded sanatoria. Since most transmission of the infection is from man to man it was another disease amenable to elimination. In the eighties, India was the first country to use Multiple Drug Therapy (MDT) at a national level. The removal of social stigma attached to the disease required multiple strategies. In states like Maharashtra the stigma was less as Mahatma Gandhi set an example by personally caring for his friend suffering from leprosy. Other parts of the country required information campaigns in public media, motivation by religious leaders, Christian nuns, politicians and celebrities to persuade the patients to come to the clinics. Beggars resisted as they earned more money by sitting near temples where worshippers assuaged their conscience by donating to the sick. Since the disease does not cause pain, there is less motivation to consult doctors. It was not till the patients were convinced that disability and disfigurement would be avoided by early treatment with MDT was leprosy believed to be a curable disease. Once curability was established and communicated through television, public talks, and street plays, social ostracism was reduced This enormous social mobilization and motivation was strengthened further by regular supply of drugs, home visits by medical and paramedical staff so that the patient did not loose his daily wages by the time wasted in travel to the hospital. World wide clarion call to eliminate leprosy first initiated by the WHO was soon taken on by not only national governments as in India but also by non-governmental agencies in the west. Almost every developed country had such agencies which traditionally helped to care for the leprosy victims from time immemorial. They united as an international agency - ILEP and gave more structured and formalized assistance to national governments and WHO. The assistance was for treatment, training, provision of drugs as well as for research intended for early diagnosis, prevention of disability and vaccine. Since the leprosy bacteria cannot be cultivated in the laboratory novel methods had to be devised to study it and understand how it caused disease. Some of best brains around the world became interested in the challenge of the immunological defect in leprosy that led to different forms of leprosy from the benign self curing varieties to the more generalized infective forms.

This kind of cooperation and communication between researchers, field workers, social workers, religious leaders, governmental administrators and politicians became a model for tackling diseases of public health importance. Medical workers who had to be given special incentives to treat leprosy patients were no longer needed as the patients could be seen in general clinics along with other patients.

Governments slowly dismantled the special service mechanisms and integrated the leprosy programme into the primary care services. By the beginning of 2005 the world recorded only 300,000 patients most of whom are mainly in India and Brazil. The number of new cases is reducing by 20% annually except in India. Finally WHO handed over the leprosy programme from its headquarter in Geneva to the South East Asia Regional Office in New Delhi on 1st March 2005.[8]

Newer diseases are bound to emerge as long as there is life on this planet. However, they would be conquered if there is a united effort of nations, sharing of knowledge and communication of best practices to others. More importantly the vulnerable and marginalized people need to become partners with the planners, if the hi-tech research and high quality drugs and vaccines are to make an impact. It is not only the low income people that require information but also the citizens of the more developed nations who find new interventions to be worrisome. The present trend of top-down passing of knowledge must be changed to one of equal partnership based communication if public health measures are to become universally effective. Infectious diseases do not respect wealth or geopolitical barriers; current evidence on bird influenza indicates that they do not respect species barriers either; they will affect all peoples unless mechanisms are put in place for international cooperation and dialogue with the diverse communities of this planet. The avian flu is being predicted as the next pandemic and the fear is that at present, the world is ill prepared to tackle it.

Notes and references

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Indira Nath was born in Andhra Pradesh in India 14 Jan 1938. Schooling in La Martiniere, Calcutta, Medical Education MBBS (gold medalist as best graduate) and MD Pathology in All India Institute of Medical Sciences, New Delhi (the premier medical school and hospital created by an Act of Parliament). Fellow of Royal College of Pathologists, London, Fellow of 4 Science and Medical academies. Research contribution is in the area of Immunology of infectious diseases. Recipient of prestigious national and international awards for research in immunology of leprosy. The last ones were UNESCO L'Oreal Award for Women in Science, Asia Pacific region, DSc from Pierre and Marie Curie University of Paris 6. Civil honor of Padma Shri from President of India, Chevalier National Order of Merite from President of France, Honored on Tuscanny Day in Florence. She has been member of Scientific Advisory Committees to 2 governments of India. Founder Chairman and Senior Professor of Department of Biotechnology at All India Institute of Medical Sciences and Dean, School of Medicine, Asian Institute of Medicine, Science and Technology, Malaysia. She is actively involved at Government level for Career Prospects of Women Scientists. She has been Foreign Secretary of Indian Science Academy and Vice President and Council Member of Indian Academy of Science.