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Invited Articles

Public Health and Virus Diseases

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It is for me a particular honor to be in Calcutta and a pleasure to salute you as you celebrate the 30th anniversary of the Indian Public Health Association. This is an especially auspicious month, as it represents also the 10th anniversary of the occurrence of the last case of variola major - a landmark event in public health and medicine and a triumph for India which has been hailed by the Director-General of the World Health Organization as one of the greatest achievements in medical history. It is, however, but a portent of what public health can and will achieve in the decades ahead as experiences a new renaissance

It is fitting that your program for the Public Health Association deals with virus diseases because however miraculous the advances of modern medicine, curative medicine, even today, offers almost nothing in therapy for the virus diseases. Many have experimented with antiviral drugs and while a few have offered some benefit, the cost, for prevention or for treatment by drugs, for exceeds the cost of prevention by immunization. Much progress has also been made in the field of rehabilitation medicine, benefiting, for example, those paralyzed by poliomyelitis but again, this is extremely costly and, on balance pitifully ineffective. For the ravages caused by such as measles, rubella, hemorrhagic fever and hepatitis, supportive therapy is helpful, but in truth curative or rehabilitative medicine is today little more helpful than it was 50 years ago. With respect to smallpox, a disease I care to know well, neither therapy nor rehabilitation offered significant benefit. As we look to the future to determine what can be done about the viral diseases, we must look to prevention and to public health, as there is little today in the research laboratories which offers promise either in cure or rehabilitation.

For at least 30 years, our attention has focused primarily on the potential and application of curative and diagnostic techniques, including such as antibiotics, organ transplantation, computerized tomography, renal dialysis and many others. The press, the public & the politicians, let alone those in medical research and practice, have been captivated by these new developments and the response, both in my country and yours, has been to expend billions for therapy and pennies for prevention. Numerous hospitals have been built; medical schools have multiplied and prospered; but few schools of public health have been built and those that did exist have barely managed to survive. However today, attitudes are beginning to change as increasingly it is being appreciated that results in terms of better health and a better quality of life for a nation's population has scarcely been commensurate with the enormous sums of money invested. Even with a disease as severe as smallpox and so simply prevented with an inexpensive vaccine it took policy-makers and health authorities a long time to realize that we were better served by preventing smallpox than by hospitalizing patients. Despite the fact that we had a highly effective vaccine available to us for more than 150 years and a heat stable form suitable for tropical climates for at least 40 years, we did not succeed in stopping transmission until less than a decade ago. Meanwhile, hundreds of millions of patients were affli-

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cted, and millions were hospitalized. When finally a decision was made to eradicate this disease, the effort succeeded in little more than 10 years and at an added cost globally of only nine crores of rupees each year. To hospitalize the 10-20 million cases which were occurring each year during the middle 1960s would have required at least five lakh hospital beds. I need not note that nine crores of rupees would scarcely have built one good-sized hospital.

A comparable situation pertains today. For more than 20 years, we have had available to us two other highly effective virus vaccines for poliomyelitis and for measles and yet today, millions of hospital beds are occupied by patients with measles and poliomyelitis who are seriously ill, paralyzed and dying. Yet, at best, hospitalization and curative medicine can provide little to any of these patients beyond supportive therapy.

Attitudes and policies, however, are now beginning to change. With the evident and increasing success in the smallpox program, questions began to be raised by health administrators in many countries as to why other vaccines could not also be administered widely and inexpensively. Thus, the WHO Expanded Program on Immunization (EPI) came into being in 1974. At that time, data shows that less than 5% of the world's children were receiving the six well-tested vaccines which constitute the core of the EPI program: diphtheria, tetanus, measles, poliomyelitis and tuberculosis (BCG) vaccines. During the succeeding seven years, many smaller countries began EPI programs and indeed, some small countries were successful in reaching levels of coverage which were on the order of 80-90% or greater. In such countries, poliomyelitis disappeared and diphtheria, tetanus, pertussis and measles cases all but ceased. With so many fewer children in hospitals due to these causes, the result was, in fact, equivalent to the creation of many new hospitals but at a minute cost. UNICEF was impressed by the results and made a major commitment to solicit and to make available substantial additional resources for this program.

In the spring of 1984, a new commitment to child survival programs was proclaimed at a special meeting convened by the Rockefeller Foundation and attended by the respective heads of WHO, UNICEF, the United Nations Development Program and the World Bank, as well as representatives from a number of bilateral agencies. The meeting reaffirmed its support for the WHO objective of establishing systems which would permit 90% of the world's children to be vaccinated annually by 1990. As one who attended that meeting, the goal appeared all but utopian and the need for resources substantially greater than any could visualize being made available. However, at a second meeting in October 1985, convened in Cartagena, Colombia, by the President of that country, unbelievable changes had occurred. It was reported that more than 40% of the world's children were now being vaccinated with the six vaccines and resources in quantities undreamed of were being pledged by both multilateral and bilateral agencies. Providing added optimism was the fact that the ministers of health in attendance from many of the larger countries pledged their support to achieve the goal of 90% immunization of children in their respective countries by 1990. What was more of a hope than a realistic goal only two years ago has become an achievable expectation.

More is promised, however, and in the vaccine field, the promise is extraordinary. Sir Gustav Nossal of Australia, in a recent paper, stated "Now, without doubt we are on the threshold of another major revolution in vaccine research, comparable or even exceeding in its scope that began when the polio virus was first grown in tissue culture." Today it appears inevitable that within the next decade we will have available new and improved

vaccines in unprecedented number. The reason for this, of course, is the new biotechnology and its capacity to achieve in but a few years what once required decades of laboratory trial and error.

The provision of new vaccines, however, is but one step in the problem. As important is the question of whether we can apply them efficiently and effectively. As difficult as developing new vaccines are, the problems which we must anticipate in producing heat stable vaccines in volume and at sufficiently low cost. No less complex are the problems of developing system to permit vaccines to be delivered efficiently to large populations. Effective population-based programs will never succeed if persons are required to come to health centers to seek vaccination. Experience has demonstrated again and again that it is difficult to assure that health workers vaccinate at every opportunity all their clients. Proper distribution and storage of vaccines is a no less formidable challenge. In country after country, health officials have found that even with their best efforts, it is difficult to achieve vaccine coverage of 80% even among those living within one to two kilometers of a health center. For those living at a greater distance, the proportion vaccinated falls off rapidly. Thus, it will be necessary to organize programs to take the vaccines into villages, to mobilize community response and understanding and to provide for the necessary well-supervised delivery system and a mechanism for assessing the results obtained. When we were able to do this in the Smallpox Eradication Program, it was possible to assure vaccination of 90% or more but, remember that smallpox vaccine was able to be administered far more easily and was far more heat stable than other vaccines. Thus, the challenge for future vaccination programs is substantially greater and public health research and management is more vital and needed than ever before.

It seems to me that we are on the verge of a new era in medicine and health, which, as with smallpox, demands the best not only of national scientists and a national public health community but an international one as well. Health is indivisible and must transcend national borders; it is not a subject of parochial pride. An interesting comment reflective of this was the statement of Raymond Fosdick, then president of the Rockefeller Foundation, who stated at the time the second world war was in progress. "In peace as in war, we are all of us the beneficiaries of contributions to knowledge made by every nation in the world. Our children are guarded from diphtheria by what a Japanese and a German did they are protected from smallpox by an Englishman's work; they are safe from rabies because of a Frenchman; they are cured of pellagra through the research of an Austrian. From birth to death, they are surrounded by an invisible host—the spirits of men who never thought in terms of flags or boundary lines, and who never served a lesser loyalty than the welfare of mankind. The best that every individual or group has produced anywhere in the world has always been available to serve the race of man, regardless of nation or color." (Fosdick, 1952)

Reference:

Fosdick, R. B., The Story of the Rockefeller Foundation. Harper and Brothers, New York, 1952.