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REVOLUTION IN CHILD SURVIVAL

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This is a marvelous celebration - an exceptional and fitting climax to a memorable University Commemoration. Our Society of Alumni has done itself proud both in regard to today's program and the banquet this evening. May I take this opportunity to welcome and to salute you all alumni, faculty, friends and students. What a great School we have - and what a marvelous time it is to be in public health!

It is hard for me to believe that 13 years and 22 days have elapsed since I returned to Johns Hopkins - entirely innocent of the culture of academia and its marvelously arcane and protracted debates over pedagogy and parking. Fortunately, an able and tolerant faculty with battle-tested administrative colleagues patiently provided me a needed education. The most important insight came when I realized that my position at WHO and at Hopkins were really not too dissimilar. At WHO, I was ostensibly responsible for a global campaign with programs in progress at any one time in perhaps 30 to 50 countries. However, WHO and I - as director of the campaign, had no real authority over any of the national programs. Each nation was sovereign and WHO's role was almost wholly that of persuader-cheerleader-fund raiser and reporter of global progress. Such self-satisfaction as one could take in Geneva was entirely reliant upon the remarkable accomplishments of tens of thousands of health staff in all parts of the world. At Hopkins, however, I discovered that the Dean's role was different in one important respect - I did have control over one reserved parking place. And so, as we celebrate the growth and development of this, the world's oldest and largest school of public health, we appropriately do so together - faculty, alumni, administration and students. Happily, I

have had the opportunity over these many years to serve as the head cheerleader.

It is in that role tonight that I should like to reflect briefly with you one of the most exciting and little appreciated developments of our time - the revolution in child survival. Some aspects of this have been presented in the symposium this morning. It is a revolution still gaining momentum. It has a long way to go. But rather than recounting the still countless thousands of preventable deaths and illnesses as is so customary, we need to recognize that rapid changes - quite as remarkable as the political changes in eastern Europe - have already begun. Even more is possible. At the vortex of this revolution - as catalyst and key contributor - is the School of Hygiene.

Healthy children, wanted by their parents, is the primary building block for the future of all nations. Many factors can thwart the eventual realization of their potential but the health of children represents a critical departure point.

In the United States and other industrialized countries, the last century has witnessed profound, indeed dramatic improvements in children's health. Today, we know that of 100 children who are born, 99 will celebrate their fifth birthday. And, based on recent trends, the mortality rate for those under five years should decrease again by half within the next decade. Indeed, countries such as Finland and Sweden are already approaching such levels. The result is that in the

industrialized world, the death of a child is now a highly uncommon event.

My parents grew up in a different world - and this was not so long ago. In the U.S. in the first decade of this century, 18 of every 100 children did not live beyond 5 years; life expectancy was only 47 years; and 26 of our 96 largest cities had no sewerage system whatsoever. And yet, at the turn of the century, the United States was comparatively prosperous, with a per capita income equivalent to that of Hungary, Portugal or Argentina today. And the U.S. census of 1900 revealed that nearly 90% of all adults were literate. Interest in the application of science to health, however, had not matured. I summon as witness the behavior of the Superintendent of the New York Hospital and then President of the American Hospital Association. It was in 1900 that he declared: "I am absolutely at a loss for an understanding of the value of a medical library in a hospital." Accordingly, he closed the library and gave away its books.

The transformation of health conditions in the U.S. had far more to do with application of science to health than to either prosperity or literacy, *per se*. Today, we are at last beginning to deal scientifically and practically with health conditions in the developing world. The "Child Survival Revolution" is one of the most important of these initiatives. It is a response to Mahatma Ghandi's lament near the end of his life when he said: "I am hard hearted enough to let the sick die if you could only show me how to prevent others from becoming sick." It is a universal effort in which nations throughout the world are

participating, joined by such disparate groups as the World Health Organization, the international and regional development banks and by Rotary International which itself, has raised \$250 million for the effort. Dramatic progress has already been made. Surprisingly, however, the program and its achievements are yet little known. Thus, my presentation tonight is intended to describe briefly something of the genesis of this Revolution, its progress and its rationale.

Before doing so, let me offer some data which illustrate the magnitude of change over the past 30 years, most dramatically during the past decade and let us contrast these data with those of the United States in 1900. In the U.S. in 1900, as I told you, 174 of 1,000 children (17%) did not live to celebrate their fifth birthday. In 1960, such was the case for 75 of the world's largest 130 countries - well over half of all countries. Today only 27 countries have rates that high. The U.S. life span in 1900 was 47 years. Thirty years ago, 1 in 3 countries recorded life spans as short or shorter. Today, only 12 countries in all have such short life spans.

The important point to be made is that significant improvements in health in our own country are comparatively recent - that the health experience of my parents was comparable to that of many of the poorest developing countries today. And while many now view the developing world as an unchanging morass of poverty, disease and despair, change is possible, it is occurring and it is progressing at a far faster rate than it did in the U.S.

The Child Survival Revolution represents a new recognition of the potential of simple, inexpensive interventions to prevent disease and death and to promote the well-being of children. No less important has been a growing appreciation by political leaders that improved health plays a vital role in development, that healthy children offer a better hope for achieving their country's aspirations.

The genesis of the Child Survival Revolution has its origin in not one but several developments. To identify the most important helps to characterize it. An important component and its foundation, was the objective of providing well-established vaccines against six of the major disease to all of the world's children - the diseases being poliomyelitis, measles, tetanus, whooping cough, diphtheria and tuberculosis. This initiative followed inexorably from the experience gained in smallpox eradication. That program, coordinated by WHO, succeeded in only a decade, and at a total cost of less than \$8 million per year in international support, in eliminating from the earth one of the most feared diseases known to man. Smallpox was a disease which, when the program began, annually claimed more than 10 million victims despite the fact that an effective vaccine had been known and available for more than a century and a half. However, an intensified program eradicated the disease in a little over 10 years. What accounted for this abrupt change? First was the surprising discovery that, as recently as 1967, little of the vaccine in use met accepted standards. A WHO program requiring simply that all vaccine used in the program be of assured quality, as attested by international laboratories, made a profound difference. It was WHO's first effort to assure the quality of

a product worldwide. Second was the observation that in most countries, trained health personnel were in surprisingly plentiful supply and that even with moderately effective supervision, they were capable of a remarkably high standard of performance. The numbers needed were really very small. Competent, motivated leadership, even though few in number, made the difference. Third was the discovery that villagers, when properly approached, were usually willing, in fact, eager, to cooperate in the program and often could serve as volunteer workers. Fourth, but most important, was the finding that a system for the routine notification and investigation of cases and outbreaks could be reasonably easily established and that the findings were invaluable in guiding strategy, in monitoring progress and in allocating resources - the simple concept of Alex Langmuir's surveillance.

It seemed only logical to us that other vaccines might similarly be applied with good effect and, in the course of doing so, might serve to strengthen national health systems. Thus, as the smallpox eradication program was concluding, an Expanded Program of Immunization was launched - at a time when less than 5% of all children in developing countries were receiving any of the vaccines which were in common use in the industrialized countries.

In retrospect, it seems paradoxical that so little attention has been directed to providing vaccination, the single most cost-effective, most innocuous procedure in our entire medical armamentarium - and the simplest to administer. Viewed from another perspective, one might indeed ask the question - If a health service cannot effectively perform

the simplest and most effective of all procedures, what does it suggest about other aspects of a health care system? What it says is that what we had were sickness-care not health systems. Gradually, the immunization program gained momentum and over the past years, progress has accelerated. Today, more than two-thirds of all children in the developing world are being vaccinated. With Dr. de Quadros' brilliant leadership, as he described this morning, poliomyelitis incidence in the Western Hemisphere fell rapidly to such low levels that in 1985 an eradication program was begun. An extensive system for reporting and investigation of cases is now in place. For the past 8 months however - since July 1989 - no case has been found anywhere in the Western Hemisphere. And now, a global eradication effort has begun.

The second and more recent development contributing to the Child Survival Revolution was the discovery that deaths from diarrhea could be sharply reduced with a simple oral rehydration solution comprised of salt and sugar. Mike Merson has been the creative architect of this global program. As he noted this morning, School of Hygiene faculty working in India played a central role in this discovery. The first 1,000,000 packets were purchased by UNICEF in 1975 - they lasted 18 months. Today, more than 1,000,000 packets are used daily. National programs are in progress in more than 100 countries. Indeed, even in this country, pediatricians are finding that effective oral rehydration, provided early, diminishes the need for hospitalization and intravenous therapy.

A third and more recent development, an intervention which has only begun to be exploited, was the discovery by Al Sommer and his colleagues at our Dana Center that the periodic administration of vitamin A can result in a dramatic decrease in childhood deaths in many parts of the world, largely deaths due to respiratory disease and diarrhea. Sommer's teams administered vitamin A in standard UNICEF capsules costing about seven cents, once every six months to one to six-year-old children in one group of Indonesian villages; a second group of villages served as a control. Death rates among children in the control villages were found to be 50% greater than those receiving vitamin A. Decreases in deaths due both to respiratory disease and diarrhea were observed. From other studies, it became apparent that vitamin A was vital to the maintenance of the integrity of surface epithelium and to humoral and cell-mediated immunity - effects which are compromised even among those who are marginally deficient. Vitamin A, has now been accepted by WHO and UNICEF for widespread use throughout the developing world.

However significant these changes have been, more is promised. Just over the horizon are a whole gamut of new and improved vaccines. As one speaker at a recent conference observed, there are few important diseases for which vaccines are not now moving through the development process. With the new techniques available to contemporary science, the time required for their development has been greatly abbreviated and with sophisticated centers for human testing; such as our own Center for Immunization Research, field application is possible far sooner.

It is not surprising that the global community has been captivated by these developments. In consequence, increased funds for health programs have been made available and the commitment of politicians is greater than it has ever been. This September, a global meeting of heads of State will occur in N.Y. - its purpose - to focus even greater attention on child health. Note, however, that each of the new initiatives are only a decade old and indeed, most progress has been made within the past five years.

It is characteristic of revolutions, however, that in the excitement of the moment, critical deficits are often ignored or overlooked - deficits which potentially could frustrate the primary goal - in this case - healthy children who realize their full potential. This is no less the case with the Child Survival Revolution. I perceive three areas of special importance.

The first problem is that of institutionalizing systems for programs which are based in community involvement and community-wide action - and which can be sustained month after month and year after year. Many programs have so far relied on large-scale, intensive, short-term campaigns and, in doing so, they have awakened community interest and involvement in villages throughout entire areas and countries. But can such programs be sustained? In some areas, they appear to be doing so - and successfully - but there has been little experience, as yet, in doing so over large areas. Cases of illness need to be reported and investigated and epidemiological patterns discerned if they are to be controlled effectively. The leadership, support and imagination of

professionals such as yourselves will be vital if the programs are to succeed everywhere. The program is too important to be relegated solely to professional managers and professional politicians. We need trained public health leaders.

The second area of need is for an ongoing, far-reaching program of research directed toward prevention and to the solution of 3rd world problems. To program managers, such a plea is too often labeled as the irrelevant cry of academics concerned more about their own careers than "getting on with the task." We must not forget, however, that those once engaged in malaria eradication viewed that problem as entirely an administrative one - to apply DDT to the walls of houses. Deliberately, research programs were terminated. A decade later, with mosquitos resistance to DDT and a global program foundering, there were no alternatives available for scientists or research laboratories to take up the task. Politicians argued similarly when the global smallpox eradication program began. A good vaccine was available, the problem was entirely an administrative one - to apply it in the field. We resisted this view and promoted research throughout the program. By the time it concluded, little was the same as it had been - vaccine production methods had improved, new vaccinating devices were in universal use, our understanding of the epidemiology of smallpox had greatly changed and the strategy and tactics substantially altered. Indeed, without the research component, smallpox would still be with us.

In the Child Survival Revolution, we need to seek constantly for simpler, more effective tools and for better means for applying them.

For example, none of the vaccines now in use are fully satisfactory. All could be improved but none have been improved over the past 25 years. Meanwhile, although candidate vaccines are beginning to emerge from the laboratory, little support is yet being provided for testing them in the field; for the development of simpler preparations for administration; for the evaluation of different types of programs; for the application of surveillance systems to monitor progress. Nutritional research in the developing countries is almost nonexistent. As has been the history with new programs, there is a complacency - perhaps overconfidence - that the tools are now available and the only need is to apply them.

Finally and most important, we must continue to bear in mind that our ultimate goal is for each newborn to realize the potential inherent within him at birth. To assure healthy children but to fail to educate them and to provide an economy which fails to employ them is the ultimate exercise in futility. While this is in large part the provenance of educators and business, the numbers of children to be educated and employed is a critical part of the equation and is our concern. Child spacing and breastfeeding are themselves directly important to the health of the child but no less are smaller families which can be adequately fed. Family planning services are still woefully inadequate; methods of contraception leave a lot to be desired; and support for these programs by some governments (?) remains seriously deficient. While a revolution in child survival is in progress, it would be futile indeed if we didn't at the same time, address with vigor the question of numbers of children.

The potential for therapy and prevention is growing exponentially, nurtured by a magnificent base of biomedical research. You know it well - organ transplantation, fiber optics, nuclear imaging, recombinant DNA technology and others. To the press, to many of our colleagues, these developments appear to be the real challenges, the true frontiers of medicine. Indeed they are but there are other frontiers, other challenges, sometimes less newsworthy but far more dramatic and urgent if we, as a species, are to achieve equilibrium with planet earth. And the cutting edge to that problem is wanted children who are given the opportunity to grow in health to adulthood. The responsibility for achieving this cannot be relegated to those without technological competence any more than business can afford to relegate its leadership to accountants and lawyers.

At Hygiene, we are responding to this challenge. There is an urgent need for that role to grow and develop. The children of today are the adults of tomorrow and the hope of the 21st century. To the extent that their growth is stunted, their normal maturation damaged, their limbs crippled, the hopes of the future are compromised. The damage cannot be undone. Now that we have seen what is possible, it is imperative that we bring to bear the best of public health and political commitment to redress what can only be characterized as decades of neglect.

I personally look forward to playing a role in the ongoing revolution.

There have been unexpected events today which have been both extraordinary and gratifying surprises. Tonight, I am close to speechless (didn't say speechless but close to). I look about the room and realize this could well be a portrayal of "This is Your Life" - so many old colleagues and friends - from college, from my days at CDC, from smallpox eradication, from WHO. I think you missed my junior high school biology teacher but not many others. Thank you all - old friends and new - for being here tonight.

You and I both know that I represent your only barrier between cocktails and dinner - and so I have severely restricted my remarks so as to keep with the allotted 90 minutes.