The Child Survival Revolution

University of Rochester

1989 Reunion

D.A. Henderson, M.D., M.P.H.

Dean

The Johns Hopkins University

School of Hygiene and Public Health

May I express to you my pleasure in having been selected to present this alumni lecture. I must salute the class of 54 which unquestionably is the best to have ever graduated from Rochester - and indeed their steadfast loyalty in attending today a lecture which I know has less appeal than the first tee at the CC. Whatever, I acknowledge a profound debt to all of you and to a remarkable faculty for the contributions you have made to the four most important years of my life.

As you know, I was launched as an internist. I entered the field of public health through compulsory military service and eventually was adopted by the pediatricians as an Honorary Fellow. Finally, I became a dean, a specialty gauged more by one's ability to raise money and to deal with insoluble parking problems than it has to do with medicine. In July next year, after 13 years of deaning, I shall once again enter the real world but, in all of my incarnations, the foundation provided by Rochester has been the bedrock which has served me well.

The last century has witnessed profound, indeed dramatic improvements in the health of children in the United States and other industrialized countries. Today, we know that of 100 children who are born, only one will fail to celebrate his fifth birthday. And based on recent trends, there is every reason to believe that within the next decade, this rate will decrease again by half. Indeed, countries such as Finland and Sweden are already approaching this level.

The death of a child in this country is now an uncommon event. This is in stark contrast to the situation in impoverished Third World countries where as many as 20 to 25% of those born do not celebrate their fifth birthday.

Many attribute these differences to America's prosperity and education. Undoubtedly, these factors have contributed, but many fail to appreciate the fact that at the turn of this century, standards of health in the United States were little different than the poorest of Third World countries today. In the U.S. in 1900, 18 of every 100 children born 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 or Argentina today. And the U.S. census of 1900 reveals that nearly 90% of all adults were literate. Interest in the application of science to health, however, had not matured, as witness the attitude of the Superintendent of the New York Hospital and then President of the American Hospital Association. That year, 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.

It is apparent that 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, happily, we are beginning to deal scientifically and practically with health conditions in the developing countries. The most important of these activities are presently embraced within a program called the "Child Survival Revolution." 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 international and regional development banks and by Rotary International which alone has raised $250 million for the effort. Although much more remains to be done, dramatic progress has already been made and more can be foreseen over the decade ahead. Surprisingly, however, the program and its achievements are yet little known among professionals in this country. Thus, my presentation today is intended to describe briefly something of its genesis, its progress and its rationale.

Preparatory to doing so, let me offer some data which illustrate several measurements of the changes which <u>have</u> occurred over the past quarter century, most dramatically over the past decade. First, let us examine traditional infant mortality rates, comparing 1960 and 1986 (slide 1). In 1960, 45 of the 128 largest countries reported 150 or more deaths per

1,000 births. Today, only 8 report infant mortality rates of this magnitude. Note, however, that as recently as 1900 in the United States, infant mortality rates were in the range of 160 per 1000 births - today this rate would be among the highest recorded.

Another measure, perhaps a better one, has been fostered by UNICEF. It examines mortality rates under the age of five years (slide 2). Here, the progress is no less remarkable. In 1960, 22 countries reported rates above 300 per 1000 births - today, only 1 of the 128 countries records such a rate. To be noted is the fact that 50 countries have rates below 50 - 2 1/2 times the number of countries recording such levels only 25 years ago. For comparison, the United States had a rate of 174 as recently as 1900.

Life expectancy at birth, as you would expect, has increased dramatically (slide 3). For more than half the countries, it was less than 50 years in 1960. Today, nearly two-thirds of 131 countries record life expectancies of more than 60 years.

The point I would like to make is that significant improvements in health in our own country are comparatively recent - the health experience of our parents (or at least those of my generation) were comparable to those 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 occurring and occurring more rapidly than it did in the U.S. While much remains to be done, there is now real hope.

An important contributor to this change is the Child Survival Revolution, which 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 national development, that healthy children offer a better hope for achieving their own and their country's aspirations. In consequence, a new dimension has been added by a surge of national and international political will and commitment to bring this closer to fruition.

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 to all of the world's children against six of the major diseases - poliomyelitis, measles, tetanus, whooping cough, diphtheria and tuberculosis. This initiative followed inexorably from our experience 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 150 years. However, an intensified program eradicated the disease in only 10 years/9 months/26 days. What accounted for this abrupt change? First was the surprising discovery that, as recently as 1967, most of the vaccine in use did not

meet accepted standards. Some vaccine, in fact, was totally impotent. We insisted first that all vaccine used in the program be of assured quality, as attested by international laboratories, and this made a profound difference. Second was the observation that in most countries, trained health personnel were in surprisingly plentiful supply and that even with modestly effective supervision, they were capable of a remarkably high standard of performance and achievement. The numbers needed were really very small. In Africa, for example, most smallpox programs consisted of only 12 to 100 staff. 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 sometimes could serve as volunteer vaccinators. Fourth was the finding that a system for the routine notification and investigation of cases and outbreaks could be easily established and that the findings were invaluable in guiding strategy and in monitoring progress.

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 only 2% 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 had been paid 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 of procedures, what does it suggest about other aspects of its health care system? Gradually, the immunization program gained momentum and over the past 10 years, progress has accelerated. Today, more than 65% of all children in the developing world are being vaccinated; vaccine demand has tripled in the past two years alone; poliomyelitis incidence in the Western Hemisphere has fallen to such low levels that an eradication program has begun with the objective of eradicating poliomyelitis from the hemisphere by the end of 1990 and from the world by the year 2000. Note: <100 cases of poliomyelitis in the whole of the Western Hemisphere this year (We used to have this many in Rochester alone in the early 1950s). There is still a long way to go but the result, if successful, translates into the saving of more than 3 million lives.

A 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. 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 have begun in more than 100 countries and in countries as diverse as Egypt, the Philippines and Honduras, diarrheal disease mortality has dropped by 50%. Indeed, pediatricians, even in this country, are finding that effective oral rehydration, provided

early, diminishes the need for hospitalization and intravenous therapy. We've even begun to use ORT, as it is called, at Johns Hopkins.

A third and more recent development - an intervention which has only begun to be exploited - is based on the recent discovery by Sommer and his colleagues at Johns Hopkins that the periodic administration of vitamin A can result in a dramatic decrease in childhood deaths in large parts of the world - deaths due primarily to respiratory disease and diarrhea. The seminal study was conducted some five years ago when Sommer's teams administered vitamin A in standard UNICEF capsules containing 200,000 IU, once every six months to children under five years in one group of Indonesian villages; a second group of villages served as a control. Death rates among children in the control villages were 50% greater than those receiving vitamin A. 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, previously given for the prevention of xerophthalmia, has now been accepted by WHO and UNICEF for widespread use throughout the developing countries.

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 biomedical science, the time required for vaccine development has been greatly

abbreviated. In nutrition, one may speculate, as well, that there may be other micronutrients, in addition to vitamin A, which likewise may be marginally deficient but as important to health.

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. Note, however, that each of these 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 two areas of special importance in which we need to take a special interest.

The first is for an ongoing, far-reaching program of research. 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." Let us 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 a global program foundering, there were no alternatives available and no 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 research, smallpox would still be with us.

In the Child Survival Revolution, a number of simple, cost-effective measures are now being widely applied. This effort must continue but, at the same time, 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 is fully satisfactory. All could be improved. Meanwhile, candidate vaccines are beginning to emerge from the laboratory, but 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.

Secondly and <u>most important</u>, 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 or 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. Child spacing and breastfeeding are of themselves directly important to the health of the child but no less are smaller families which can be adequately fed and educated. 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. (Let me not refer to the woeful behavior of the U.S.A. which before 1980 was a leader in this effort). While a revolution in child survival is at hand, 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, indeed 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. Your leadership and your

articulate voice, as specialists in medicine, are even more vital to its realization than they have been in the past 100 years.

References

Preston, S.H. 1985. Resources, Knowledge and Child Mortality: a Comparison of the U.S. in the Late Nineteenth Century and Developing Countries Today in *International Population Conference*, Vol. 4, pp. 373-386. International Union for the Scientific Study of Population, Florence.