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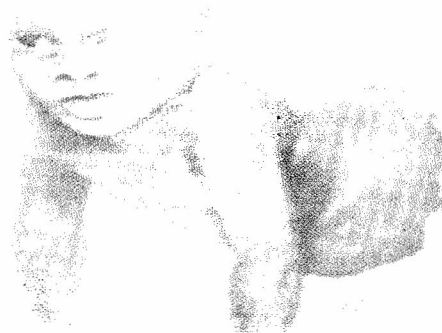
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CHILD



IMMUNIZATION: AN UNDERUTILISED BATTLE AXE IN THE PREVENTION OF CHILDHOOD INFECTIONS

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INTRODUCTION

Clean water and vaccines are two public health inventions that have had the greatest impact on the world's health¹. The power of vaccines is related to their ability to induce immunity. Immunization has proven to be a very cost effective and successful means of preventing infectious diseases. It has brought about marked reduction of common contagious diseases and millions of deaths have been averted.

The ultimate goal of immunization is eradication of disease. Globally, smallpox has been eradicated and poliomyelitis is on the verge of eradication as well². Already, it has been eradicated in the United States of America and some parts of Europe. UNICEF report indicates that, at the end of 2000, all the world's regions had either achieved or were close to polio-free status with the exception of Sub-Saharan Africa. Invasive haemophilus type B infections has been reduced to less than ninety-five percent in some industrialized countries³.

It is however regrettable and profoundly tragic that almost two million children die each year from diseases for which vaccines are available at low cost¹. These deaths mostly occur in developing countries. Measles causes of about one million under five children annually while tetanus results in the death of 215,000 newborn babies and 30,000 women annually. UNICEF estimates that about 26 percent of children almost 34 million infants, still do not have access to basic immunization each year³. The lowest coverage occurs in sub-Saharan Africa.

Immunization is no doubt underutilised especially where it is most needed. The reasons for the current underutilisation are many and complex and extend beyond lack of funds. Indeed, even in the developed world, many years elapsed between invention of some current vaccines and their widespread use in immunization programs. Acceptance and utilization was initially slow too. One purpose of history is to help us to find way of avoiding past mistakes. It may therefore be worthwhile to look back briefly.

VACCINATION HISTORY.

The Invention Era

The end of the 19th century to early 20th century witnessed marked achievement in areas of vaccine as a result of the pioneer work of the likes of Louis Pasteur and Edward Jenner. It took more than 200 years between Jenner's invention of vaccinia for smallpox and its widespread use for vaccination programmes⁴. Since the invention, the number of vaccines has increased and though initially crude in some respect, they were efficient and dramatically reduced the burden of death and disease.

The date of introduction of first generation of vaccines for use in humans*

- 1798 smallpox
- 1885 Rabies
- 1897 Plague
- 1923 Diphtheria
- 1926 Pertusis
- 1927 Tuberculosis (BCG)
- 1927 Tetanus
- 1935 Yellow Fever

After World War II

- 1955 Injectable Polio Vaccine (IPV)
- 1962 Oral Polio Vaccine (OPV)
- 1964 Measles
- 1967 Mumps
- 1970 Rubella
- 1981 Hepatitis B

*This list is not exhaustive. (Plotkin SA and Mortimer, EA, 1994)¹.

Vaccinations were initially employed in epidemics for the high risk individuals and gradually the use spread to larger groups and then to individuals, first to the rich and later to the poor.

Early National Immunization Programs (1900-1973)

The use of available vaccines during this period was mainly in the industrialised world.

In the second half of the 20th century early national immunization programs were organized with the adoption of an immunization schedule and mass immunization campaigns. Much progress was made in the 20th century. By 1950, no fewer than 14 new improved vaccines had been added to the arsenal of vaccines used in the first half of the 20th century¹. By 1956, WHO selected smallpox for eradication from the globe. In 1978 smallpox was declared eradicated².

The Expanded Program on Immunization (EPI)

In 1974, following the success of smallpox eradication, the Expanded Program on Immunization was created. "Expanded" because most programs then had only used smallpox, BCG and diphtheria, tetanus and pertusis (DTP) vaccines. EPI included two new diseases. The six diseases chosen for prevention by immunization then were tuberculosis, diphtheria, neonatal tetanus, whooping cough, poliomyelitis, and measles. The decision to include a disease was based on factors such as a high burden of disease and the availability of well-tried vaccines at an affordable price.

"Expanded" also meant increased coverage. Incredibly, apart from the large scale global drive in mass country

wide campaigns to eradicate smallpox, less than 5% of children in developing countries had access to routine immunization services before EPI⁵. With EPI, coverage was remarkably increased in the developing countries.

Other vaccines were added to the EPI list by WHO. These included:

- yellow fever (in endemic countries)
- Hepatitis B
- MMR (in many industrialized countries in place of measles)

CURRENT SITUATION

Routine immunization is currently used to prevent ten diseases in the USA namely:

Diphtheria, Tetanus, Pertusis, Poliomyelitis, Measles, Mumps, Rubella, Hib, HBV and Varicella. Some vaccines are recommended for some groups of children in special circumstances. More than fifty immunobiologic products are licensed in the U.S. There has been tremendous success in controlling childhood infections with vaccines in the developed countries (table 1)⁶.

By 1988, the World Health Assembly responded to the remarkable successes of the Americas in controlling poliomyelitis by selecting this disease as the next disease to be targeted for global eradication. The presence of pockets of low coverage which was observed with the success of EPI also meant there was need to mount more effective surveillance for some target diseases which were also marked for eradication or reduction. These include neonatal tetanus and hepatitis B.

The key to polio eradication is hinged on effective surveillance for all cases of acute flaccid paralysis in children. Worldwide, there are six reference laboratories and sixty national laboratories for biological confirmation of diagnosis of suspected cases. Identification of the source of virus by molecular studies is also being undertaken.

All countries embarking on polio eradication have undertaken mass campaigns using OPV, followed by "mopping" (house-to-house visits) in locations where cases persist.

In 1994, the Americas were declared polio-free³. Over time global coverage increased with involvement of other organizations like UNICEF, Rotary International and more recently Global Alliance for Vaccines and Immunization (GAVI). The concern of disease control and eradication by immunization rose and activities have heightened.

Even though eradication of Polio for 2000 was not achieved, much progress has however been made. In 1988 when the WHA took the decision to eliminate poliomyelitis, it was endemic in more than 125 countries in 5 continents, causing paralysis of 1000 children everyday. Currently only six countries in the world remain polio-endemic: Nigeria, India, Pakistan, Egypt, Niger and Afghanistan. At the end of 2003, Nigeria had the highest number of polio cases 302, accounting for 45% of all confirmed cases globally⁷.

Table 1: Review of vaccine-preventive disease status in the United States

Diseases	Highest Incidence (yr)	Vaccine Discovered	Recent Incidences 1993	1994	1995
Diphtheria	206,939 (1921)	1921	0	2	0
Tetanus	1,560 (1923)	1923	43	51	37
Pertussis	265,269 (1934)	1934	6,335	4,617	4,509
Poliomyelitis (paralytic)	21,269 (1952)	1955	3	1	0
Measles	894,134 (1941)	1963	281	963	294
Mumps	185,691 (1967)	1967	1,640	1,537	850
Rubella	57,686 (1969)	1969	195	227	149
Congenital Rubella Syndrome	20,000 (1964-65)		7	7	7
Haemophilus Influenzae type B	18,000 (1984)	1985	1,264	1,174	1,176

Data from centers for Disease Control (3) and Vetter and Johnson (4)

How has the vaccine (battle-axe) been used in Nigeria?

Nigeria adopted EPI in 1979, and as mentioned earlier was one of the developing countries with good coverage. Some areas of South Western Nigeria had about 80% coverage in routine immunization for the six childhood diseases between 1996 and 1998⁸. Unfortunately, the success was not widespread or sustained.

The reasons advanced are many and include inadequate disease surveillance and poor immunization services delivery system resulting from poor governance and lack of political will. A boost to immunization in Nigeria occurred in the late 1990s⁹. The National Programme on Immunization (NPI) was promulgated by decree in 1997 and accommodated plans to eradicate polio by the year 2000. Considerable effort was made in improving the immunization coverage of vaccine preventable disease without the marked achievement recorded in the industrialized world.

Current Status in Nigeria

Table 2⁸. Reported Routine Immunization Coverage (%) 1995 - 2000

REPORTED ROUTINE IMMUNIZATION COVERAGE (%) IN NIGERIA 1995 - 1999

	1995	1996	1997	1998	1999
B C G	42	36	29	33	13
D P T 3	32	21	21	26	19
O P V 3	29	21	25	27	23
M E A S L E S	41	32	37	57	26
T T 2+	34	38	23	41	30

SUMMARY OF VACCINE PREVENTABLE DISEASES

DISEASE Cases per year	1995	1996	1997	1998	1999
PERTUSSIS	13639	26745	33729	49550	50039
DIPHTHERIA	1556	2768	3285	6071	3996
MEASLES	49880	59134	73735	164096	215995
AFP CASES				513	1237
POLIO CONFIRMED CASES				53	95
YELLOW FEVER	25	0	0	0	0
NEONATAL TETANUS	1064	1550	1086	1806	1669
CEREBRO SPINAL MENINGITIS (CSM)	7378	108991	39973	10793	4586

Going by the low level of reported routine immunization coverage (table 2), Nigerians are yet to respond appropriately to the fact that vaccines are the most cost effective public health tool in history. It is an underutilized weapon in the fight against childhood infections in the developing countries where they are most needed as infectious diseases are the most important causes of mortality and morbidity. The very low vaccination coverage for measles, a major childhood killer as well as neonatal tetanus is very pathetic. The recent controversy which surrounded the oral polio vaccine has negatively affected the concerted effort by the National Programme on Immunisation (NPI) to ensure that Nigeria will be among the countries to become polio free by 2005, the new date for global eradication of poliomyelitis⁹.

The Role of the Health Worker.

While NPI is working toward improving coverage and making efforts to expand immunization to cover newer vaccines, the health worker has the important role of

keeping abreast with current information in order to play his part in advocacy for proper and improved utilization of vaccines. Immunology has gone from small laboratories to a discipline that has the most advances in research and combines advance techniques in molecular biology, microbiology as well as biochemistry.

For doctors, the challenge for the future lies in keeping up to date knowledge on current vaccine development, recommendations and adverse reactions taking advantage of every opportunity to educate, and encourage the immunization of children.

Immunization should be considered at all patient visits, including OPD, routine clinics, emergency departments, and in-patients. These are all opportunities, which are often missed.

It is important to distinguish the process of immunization from vaccination, as one can be vaccinated but not immunized if the induction of immunity does not follow the administration of a vaccine. The mechanics of immunization are critical to its success. These include giving adequate recommended doses, ensuring that the route and technique of administration and schedules as well as handling are correct. Because of possible hypersensitivity to vaccine components, vaccines should be administered only when emergency equipment and drugs, such as epinephrine, are readily available.

The doctor or healthcare giver must ensure that vaccines are stored at the appropriate temperature and handled correctly avoiding bacterial contamination.

Outside the healthcare sector, schools, colleges and workplaces can be co-opted in health education on the benefit of immunization and improving coverage. Some countries have used immunization records as a prerequisite for school enrollment.

ADVERSE EVENTS AFTER VACCINATION

Effective use of immunization requires good knowledge of the adverse effects. Although modern immunizing agents are generally safe and effective, they can be associated with adverse effects, which range from mild to life threatening. Adverse reactions would be local or systematic

- allergic reactions
- urticaria
- anaphylaxis
- encephalopathy and convulsions are known to occur with DTP vaccine. The whole cell pertussis is said to be the culprit¹⁰

It is important to distinguish between precautions and contraindications. While a precaution specifies a circumstance in which a vaccine may be indicated, the benefit out weighs the risk and consequent adverse effect. Example of precaution is previous history of fever of up to 40°C after vaccine. Contraindication however indicates that the vaccine should not be administered. Generally this would include moderate to severe illness, a history of anaphylactic reaction to a specific vaccine, and severe sensitivity reaction to a vaccine component.

If encephalopathy occurs within seven days of DPT, subsequent doses are contraindicated⁵. Generally a live virus vaccine should not be given to pregnant or immuno-compromised persons and recipients of high dose corticosteroids. Measles and BCG vaccines are exceptions as they are recommended to HIV-infected persons who are not severely immunosuppressed.

CONCLUSION

In it's five year National strategic plan 2001- 2005, NPI in a situational analysis and problem statement, attributed low immunization coverage to 'several factors which include lack of proper planning at state and local government level (LGA) levels, lack of up to date national immunization policy and guidelines at the service delivery points, decreasing motivation of health workers, poor quality of services, frequent 'out of stock' of vaccines at the LGA at health facility levels as well as low demand for services from the community". It is hoped that the renewed efforts of the NPI to improve the situation would be sustained and some of these problems solved to make immunization more effective in combating childhood infections.

Efforts by government, various institutions, organizations and NGO to educate the populace and health workers must be intensified and sustained. I congratulate Medical Women Association of Nigeria for being one of the forefront forces leading this way.

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