

Appropriate strategy for immunisation of children in India 3. Community-based annual pulse (cluster) immunisation

T. Jacob John, F.R.C.P., F.A.A.P., Ph.D. and
Mark C. Steinhoff, M.D., F.A.A.P.

A strategy of annual pulse vaccination is proposed as the most appropriate technique for achieving high immunisation rates in our country. Because vaccine is taken to children in their communities on announced dates, acceptance will be much higher than with conventional clinic vaccination. A simplified immunisation schedule and a family-retained record are used to reduce complexity. Vaccines and other materials are managed at a district level ; the local arrangements for vaccination are made by the PHC staff and village level workers. The advantages of this technique include higher coverage, shortened and strengthened cold chain, reduced red tape for recipients of vaccine, the involvement of private health institutions in a national campaign, and a strengthening of the PHC system.

Key words : Strategy for immunization; Pulse immunization

The choice of vaccines for routine use and their priority were discussed in the first paper of this series.¹ The present system of immunisation is clinic-based and continuous. It makes use of an immunisation schedule, which has been adapted from other countries, and not tested for appropriateness in India.² What has been our achievement by this system of

vaccine delivery ? Over 20 million infants are born each year in India, about 80 per cent in rural communities. In 1978-79, about 6 million children received their first or a subsequent dose of DPT.³ Assuming that these children have some protection, we see that about 14 million, or 70 per cent of the annual target population remain unprotected. The current methods of delivery are not achieving enough and there exists the urgent need to improve national performance through an appropriate strategy.

From the ICMR Centre of Advanced Research in Virology, Christian Medical College and Hospital, Vellore.

Reprint requests : Dr. T. John, ICMR Centre of Advanced Research in Virology, C.M.C. Hospital. Vellore 632004.

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Pulse immunisation, a new strategy

We suggest a new strategy which has been designed in the context of the need

of the community, available resources and the responsibilities of the existing health care delivery system. It is the systematic immunisation of children in annual campaigns. The community receives annual pulses of vaccine, hence the name pulse immunisation.⁴ The components of the system are the transmission of general and specific information, a simple immunisation schedule and record, the choice of appropriate dates and places for vaccine administration and the procurement, transportation and delivery of vaccines in annual cycles. Each of these facets will be discussed below.

Conventional and pulse strategies

The conventional strategy of clinic-based sporadic immunisation is an imported method. It has been successful in developed, authoritarian, highly disciplined or small countries. It has also been successful in India among highly motivated families, especially in urban areas, but has failed to make a meaningful impact on the incidence of any of the diseases against which the programme is directed. The proposed community-based strategy of pulse immunisation is more appropriate for achieving the goal of control of immunisable diseases.

These two methods are not mutually exclusive or contradictory. The former is appropriate in personalised or 'private' pediatric practice. The latter is appropriate for a national scheme. In fact, it is merely the *modus operandi* for the Government to make available a minimum number of well chosen vaccines to every child in the country. This strategy is an indigenous adaptation of the mass immunisation

approach. The pulse strategy is based on the acceptance by health institutions of the responsibility for immunisation of the local children. Conventionally, a primary health centre (PHC) or hospital announces the times of its well baby or immunisation clinics and vaccinates all children who come, ignoring those who lack the motivation or means to present themselves. The implementation of the pulse technique would encourage each health institution to assume responsibility for vaccination of all children in a specified geographic area. Private voluntary institutions should join hands with the governmental health service agency appropriate for the area, for its implementation. Staff, vehicles and other resources could be pooled to cover efficiently the assigned area. The resources of medical colleges and private health institutions would be thus used for this national goal. Because vaccine is taken to children, rather than vice versa, coverage rates are bound to be higher, and control of diseases by vaccination more likely of achievement.

The choice of vaccines

Today's national policy requires the use of DPT, DT, TT, OPV, measles, BCG, smallpox and typhoid vaccines. Of these, smallpox vaccine is no longer relevant in India.⁵ We have inadequate information on the need and efficacy of routine typhoid vaccination during childhood. Similarly, the efficacy of BCG has not yet been clearly established in India and it continues to be a controversial product.⁶ For these reasons, for a national programme of routine minimum childhood immunisations, vaccines of high priority

and established need and efficacy are chosen, namely DPT, OPV, measles and TT.¹ The intention here is not a dogmatic adherence to a list, but a realistic look at options. After a programme is established using non-controversial and high priority vaccines, periodic review and revision based on new information should be made. For this, there should be a machinery, and it is suggested that the Ministry of Health and Family Welfare, the Indian Academy of Pediatrics and the Indian Council of Medical Research should establish independent and/or joint committees to evolve achievable goals guided by realistic national policies.

The simplified immunisation schedule

The need of the community is to protect every child against poliomyelitis, measles, whooping cough, diphtheria and tetanus.² It would take about 5-6 doses of oral polio vaccine, one dose of measles vaccine, and 3 doses for primary plus one booster dose of DPT per child to achieve this. In order to give these inoculations in the least number of encounters between children and health care workers, the schedule has been simplified as shown in Table I. A rational simplified immunisation schedule will reduce confusion among health workers and parents who are currently confronted by many schedules and recommendations.² Subsequent to the pre-school immunisations, three further boosters of tetanus toxoid are included for school-based annual campaigns when children may be educated and prepared for planned parenthood.

Table I. A Simplified Immunisation Schedule

<i>A. Community-based annual campaigns at one month intervals</i>		
	Before 1st birthday	Between 1st and 2nd birthdays
First encounter	DPT+OPV	Measles+OPV
Second encounter	DPT+OPV	DPT+OPV
Third encounter	DPT+OPV	OPV
<i>B. School-based annual campaigns</i>		
First year of primary school (5-6 years)		TT
First year of middle school (10-11 years)		TT
Last year in high school (15-17 years)		TT

The transmission of information

General information such as a list of diseases preventable by immunisation and that immunisation is harmless and free of cost may be transmitted through regular media or through posters and hand bills. School children will carry information home if properly briefed. Specific information regarding the time and place of immunisation and which children are eligible for immunisation is best transmitted by a house-visit, followed by tom-tom announcement two or three days before the appointed day. The distribution of immunisation cards ahead of time makes it easier for mothers to come with credential and for the staff to make entries in the register. The immunisation card serves as the family-retained record of immunisation.

Logistics

Planning for the annual pulse will be done at district and local community

levels. The district level planning will include the arrangements for obtaining, storing, and delivering the necessary vaccines. A central vaccine store will be required to store vaccines and to despatch them in cold boxes with ice to the local sites of vaccination. Other material such as syringes will also be managed at the district level. The organisation and deployment of vehicles for transport of staff, vaccines and other materials will be managed at the district level. By staggering the dates of immunisation in different communities a supply of cold boxes and syringes may be used repeatedly, making the operation economically viable.

The campaigns are locally organised and conducted by the PHC staff, village health workers and community volunteers. They arrange the time and site of vaccination with village leaders, order and receive the vaccine and equipment from the central store, administer the vaccines, and return surplus vaccines and other materials. One local member of the team should be available the day after vaccination to see children with fever or other side effects.

Advantages to the community

In India the parents, in particular the mothers, have the responsibility to decide if, when and where they should take their children for immunisation. Often the mother does not have the necessary information to make a logical decision. Her convenience to take a child may not coincide with the time or day of immunisation clinics of the PHC or even the availability of vaccines. If her child develops fever on account of the inoculation

she has to return to the centre and go through the drill of seeing a physician.

In the new strategy, the parents are given appointments for a particular time and place, with their eligible children already identified and counted. Since children are brought in clusters, the reluctant or uninformed mothers tend to join in. The place may be chosen nearer the houses—primary school, panchayat office, a house, or even under a tree, where a large group of mothers can come quickly and return without delay. In addition, one member of the team will be available the next day to examine children with fever, will be an expression of the concern of the team for the welfare of the children, and will reinforce the confidence of the community in the team. The decision of the mother will no longer be complicated with if, when, where and what vaccine : it will be simply yes or no.

The assembly of mothers and children may also be used for health purposes other than immunising the children. For example, all women who are prospective mothers (13 to 45 years old) may be given TT, all at risk children may be given vitamin A and iron supplements. Information about the use of oral rehydrating solution (ORS) in diarrhea may be disseminated, and ORS packets made available.

Epidemiological advantages of pulse strategy

Pulse immunisation with OPV induces better seroresponse than with sporadic immunisation.⁴ This is presumably due to the spread of vaccine viruses in the community.

Measles and whooping cough are seasonal diseases, with one or two years of low incidence followed by a season of high incidence.^{7,8} Pulse vaccination can be timed for the months preceding such seasons : fortunately both are common in the cooler months of the year. Immediately after one cycle of pulse immunisation the community will immunologically resemble a post-epidemic population, and measles or whooping cough is unlikely to reappear before the next annual pulse immunisation.

Tetanus is a major problem in the newborn in India, for which childhood immunisation offers no protection except when today's children become tomorrow's parents. If we continue to achieve only low coverage, we will be forced to continue crisis immunisation of pregnant women to prevent neonatal tetanus. Therefore it is critical that we achieve as near 100 per cent coverage as possible with tetanus immunisation. The new system offers such a possibility.

Fortunately diphtheria is not a major problem during infancy and immunisation need be achieved only before the end of the first year of life. Thus the new strategy is epidemiologically more appropriate for our needs and conditions than the conventional strategy.

Advantages for health workers

Under the conventional system, the institution (eg. PHC) responsible for immunising a community should procure and suitably store vaccines and make them continuously available to the clientele. Materials management with eight products or even with the four products listed above with unpredictable demand,

is difficult. Vaccines should be available constantly but should not be kept beyond their expiry date.

Under the new system, the institution responsible for immunising a community should first assess the number of prospective recipients as infants, one-year-old, and eligible recipients in school (Table I), transmit this information to the central store, procure the four products in sufficient quantities immediately prior to the immunisation campaign, and return the left-over to the central agency responsible for supply. Thus vaccines will be fresh; wastage can be avoided; materials management becomes simpler. The system of despatch of vaccine requirement from a central store eliminates the weakest links from the cold chain.

Because the local health centre staff and village level workers are involved in annual immunisation campaigns, their contact with the community will increase. Their prestige will grow when the effect of the immunisation programme is seen, especially in the case of whooping cough, poliomyelitis and measles. Such reinforcements will tend to promote the use of health centres and contribute to the development and popularity of local health service institutions.

Horizontal or vertical

The present strategy is to offer immunisation through the existing network of health care institutions as a 'horizontal' programme. Preventive inoculations are given to well children in the clinic which is best known for the care of ill children. For the staff, priority is higher for the care of the ill child than for the immunisation of the well child. For

the mother there is inconsistency in taking a well child to a disease-station.

In contrast, a 'vertical' programme consists of the deployment of a network of personnel to deal with disease, particularly its prevention, outside the health care system. The smallpox and malaria programmes are examples. Performance may improve if immunisation is undertaken as a vertical programme, but its integration with existing health care system is economically more feasible and philosophically more sound. Thus, if immunisation becomes the assignment for a particular period of time for the staff of the health care institutions, it becomes a vertical programme within a horizontal programme. Having achieved the immunisation goals for the community, the staff return to their year-round curative work.

Our experience with the pulse strategy

This strategy was evolved first to improve the efficacy of OPV.⁴ Sabin has advocated a similar system exclusively for the control of poliomyelitis in developing countries.⁹ He advocates two doses of OPV 2 months apart annually for all children below 5 years. This is out of step with DPT, 3 doses of which are necessary for primary immunisation. Moreover, India would require about 200 million doses annually for full coverage, whereas in our strategy 120 million doses are sufficient. Either method will control paralytic poliomyelitis. We have used this system to administer OPV in about 200 villages and have been convinced of its feasibility and the high coverage achieved.

Tamil Nadu State is currently receiving large amounts of measles vaccine through a voluntary agency and this strategy has been widely accepted for its distribution with success.

Many health centre mobile teams and non-governmental organisations have found enthusiastic response when they have taken DPT or other vaccines to the community; Such programmes have tended to be occasional and without follow up. The pulse immunisation strategy makes use of this community response for systematic coverage.

The community Health Department of our Medical College has found enhanced coverage rates under this strategy compared to the conventional system. However these pieces of information are not sufficient to conclude that the feasibility and advantages of this system have been proven. We would like to encourage the application of pulse immunisation by governmental and non-governmental agencies, combined with evaluation. Evaluation should include both coverage rates and the impact on the incidence of immunisable diseases especially whooping cough, poliomyelitis and measles.

Epilogue

One sixth of the world's children are in India. Measles, poliomyelitis and other immunisable diseases continue uncontrolled and are major causes of morbidity, mortality and disability. These facts urge a fresh approach to immunisation based on our needs and strengths. The techniques and tactics of immunisation developed elsewhere may not be the best

choice for our children. We feel the strategy outlined above offers the best route to high vaccine coverage rates and eventual control of these preventable diseases. The pulse strategy has the advantage of being part of and strengthening the PHC system, while also utilising the resources of non-governmental agencies. Evaluation of the details of implementation and results will allow modification to improve the efficiency of this strategy.

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A condensed table for predicting adult stature

In 1952 Bayley and Pinneau published a set of 11 tables for predicting adult height from skeletal age and current height. The Bayley-Pinneau method is the least complicated one and is still widely used. The table presented in this paper is condensed from their data for simplicity, clarity, and easier clinical

application. It shows the decimal fraction of adult height attained at each bone age for boys and girls whose skeletal age is average (within one year), retarded, or advanced compared to chronologic age.

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