

CONCLUDING NARRATIVE SUMMARY

Inter-Regional Seminar on Smallpox Eradication

Bangkok, December 1967

I. Introduction

During the course of the 1st Inter-Regional Seminar on Smallpox Eradication, the presentations and field demonstrations as well as the discussions of successful and unsuccessful smallpox eradication programmes in endemic and non-endemic countries brought to light a number of important points relevant to the conduct of eradication programmes. These are summarized in this presentation.

Of foremost importance has been the recognition that a successful eradication programme is comprised of not one but two important components which must receive equal attention. The first component, systematic mass vaccination, has often been regarded as the only activity of importance. Programmes with this emphasis have failed repeatedly. When successful, the goal of a smallpox-free status has been achieved only with heroic efforts and at considerable expense. It is clear that from the inception of every smallpox eradication programme in every area, emphasis must be placed on the second component - surveillance. This consists of smallpox case detection, reporting, field investigation and the prompt institution of containment measures. Continuing analysis of the data obtained serves to illuminate the principal links in the transmission cycle and to point the way for future planning.

The Scientific Group on Smallpox Eradication summarized these observations in pointing out that systematic vaccination programmes should serve to reduce the reservoir of smallpox virus to the point where transmission can be interrupted by containment measures.

Vaccination coverage of 80% of all segments of the population, including such as migrants and preschool children, should be sufficient to achieve a smallpox free status if there is an effective programme for surveillance of cases and a mechanism to carry out promptly field

investigation and containment measures. Where this second activity is ignored, perhaps 90% or even 95% may require vaccination before smallpox transmission ceases. To contact and vaccinate this additional 10-15% is exceedingly costly and may, in some situations, be impossible logistically. If this basic concept in the strategy of the eradication programme is recognized, success on a national, on a regional, on a global scale is possible. If it is ignored, failure is certain.

II Important Features of Successful Eradication Programmes

As brought out during the Seminar, successful eradication programmes in their development and execution have been noted to have in common several important features.

1. A full-time programme director and directorate at national, state and district levels with authority and funds to plan and execute the programme. To provide the necessary impetus and organization to mould the uncoordinated vaccination activities into a systematic programme and to develop an effective surveillance scheme, full-time staff are requisite. It was noted in several programmes that the responsible individuals at these various levels need not be physicians. Experienced paramedical staff given sufficient authority and responsibility can be highly effective. Supervision, however, cannot be exercised from behind a desk. Provision must be made for all supervisory staff at all levels to spend at least 25% of their time in the field appraising at first hand the weaknesses and strengths, successes and failures and taking the necessary steps to guide the programme in its day by day, week by week, and month by month execution. The full-time staff and structure must be retained intact until the Maintenance Phase (as defined by the Scientific Group) has been reached. Premature dismemberment of such a staff, described in two instances during the Seminar, resulted quite promptly in a disastrous resurgence of smallpox. However, once the Maintenance stage of the programme has been reached, it is apparent that full integration of vaccination and surveillance

activities within the existing structure of the general health services can be and has proved effective and workable even where the general health services have been comparatively poorly developed.

2. Potent freeze-dried vaccine which is stored at 10°C or less and is distributed efficiently such that the vaccine is used within 30 days after leaving refrigeration. As was described during the Seminar, freeze-dried vaccine is vastly more resistant to heat than liquid vaccine. It is for this reason that the World Health Assembly as well as the Scientific Group on Smallpox Eradication recommend that only freeze-dried vaccine be used in eradication programmes. Even this vaccine, heat resistant as it is, can be destroyed by improper handling and such has occurred in at least one programme. Simple refrigeration prevents this. Needless to say, it must be potent. The World Health Organization is prepared to test, at no charge to the member governments, lots of vaccine submitted.
3. Definite plans and goals, with respect to vaccinations to be performed by area, by week, by month and by year. Clearly defined goals and conscientious attention to insure that these are met are requisites for any successful programme. In well-planned and supervised programmes, vaccinators can be expected to perform 75 to 100 vaccinations per day without difficulty. However, as described during the Seminar, poorly supervised vaccinators burdened with elaborate records and excessive equipment frequently perform no more than 5 to 15 vaccinations in an entire day. By giving priority for vaccination to those groups in which most cases are occurring, the achievement of smallpox-free status may be achieved more readily. In most areas, 80-90% of cases occur among persons with no evidence of a vaccination scar. Unvaccinated persons are most frequent among children from 0-14 years of age who do not attend school, among urban slum dwellers and among migrant populations.

4. Continuing assessment of vaccination results. To assure that vaccination technique is good and that the vaccine used is potent, a proportion of primary vaccinees should be checked 7 days or later following vaccination. This is most readily and efficiently done in children less than 5 years of age. More than 95% should exhibit primary takes. To assure that adequate coverage of various areas and population segments is being achieved, a simple check to determine the proportion with scars of primary vaccination can be rapidly and efficiently conducted. Provision should be made for such assessments to be conducted on a continuing basis. Such surveys may be done by supervisory staff at any level and at any time and, if coupled with corrective and disciplinary action, serve to assure better performance on the part of vaccination staff.
5. Development, from the inception of the programme, of a system of case detection and reporting and a mechanism to assure prompt institution of containment measures. The importance of this component of the programme was noted as being of at least equal importance to the systematic vaccination effort. For each case, information regarding age, sex and vaccination status at the time of exposure should be collected and forwarded promptly to the national smallpox directorate. Continuing analysis of these data will serve to guide and direct the programme by ensuring that proper emphasis is placed on vaccinating those age groups and population segments in which smallpox is occurring. When the number of cases declines below 200 per year in any country or large state (as those in India), every case should be investigated, confirmed and the source of infection traced. At this frequency of disease, the surveillance-containment programme is, without question, the most important component of the programme. In most programmes, the establishment of "fire-fighting" teams from the beginning of the programme has been found to be of great value. Such teams, moving rapidly and promptly to areas where cases or outbreaks are occurring, carry out the necessary investigations, ensure that patients are

being isolated to the ~~maximum~~ extent possible and vaccinate family contacts as well as residents in the area. Vaccination in this instance should be done rapidly by the collecting point system. An effective team of 3 or 4 persons in one, or at most two days should be able to conduct necessary investigations and institute containment measures including the vaccination of 400 to 600 persons in the vicinity.

6. Enactment of enforceable compulsory vaccination laws. Although every effort should be made to persuade the population of the value and need for vaccination, compulsory vaccination laws which can be enforced have been universally found to be an important adjunct to eradication programmes. As discussed during the Seminar, several provisions have been found to be workable and useful. These include: (1) compulsory vaccination of all infants born in hospitals and maternity homes (of particular value in urban areas); (2) compulsory vaccination of all school children; (3) compulsory vaccination for those employed by government and industrial firms as a condition of employment; (4) compulsory vaccination of all persons admitted to infectious disease hospitals; (5) compulsory vaccination of contacts of cases and those resident in an area declared by the health officer to be threatened by an outbreak.

III Vaccination Techniques

In many areas, vaccination techniques employed have been elaborate, requiring considerable quantities of equipment and have been less effective than simplified techniques which have now been evaluated and recommended by the Scientific Group on Smallpox Eradication. These methods were discussed and demonstrated during the Seminar.

1. Preparation of the vaccination site - Cleansing of the skin by conventional methods has been found to have no effect in decreasing bacterial complications. On the contrary, many methods employed may decrease vaccine takes and increase the frequency of local

vaccinial complications. Accordingly, no cleansing of the skin is recommended unless it is caked with dirt in which case the dirt may be wiped away with a moist cloth.

2. Contraindications to vaccination - In endemic areas, none are recognized except individuals who are obviously severely ill.
3. Method of vaccination - Comparative studies show that multiple pressure vaccination is consistently more effective than scratch vaccination. The multiple pressure technique has been less frequently employed because of the difficulty in training of vaccinators. The bifurcated needle which was demonstrated during the Seminar permits simple multiple puncture vaccination which can be easily taught. Fifteen strokes with the needle are recommended for both primary vaccination and revaccination. Use of the bifurcated needle will also result in a saving of vaccine since only 0.002 ml of vaccine is used for a vaccination compared to 0.010 ml employing conventional techniques. The "Ped-O-Jet" jet injector has now been employed in routine field use for the past year and has been found to be durable and effective. It is anticipated that all programmes will find the jet injector to be of value in urban areas and for "fire-fighting" teams.
4. Presence of blood at the vaccination site following multiple puncture or scratch vaccination - The presence of a trace of blood in the vaccination site within 15 to 30 seconds after vaccination provides a guarantee that vaccination has been performed with sufficient vigour. It is commonly believed that if blood appears, it will "wash away" the virus. This is not the case. However, if a trace of blood is not seen, it is probable that the scratch or puncture was not sufficiently deep to inject the virus particles to accomplish successful vaccination.

IV Assistance to National Programmes

Prior to 1967, WHO had virtually no funds for smallpox eradication. The Nineteenth World Health Assembly made available approximately \$ 2.5 million in the regular budget for "(a) such supplies and equipment as are necessary for the effective implementation of the programmes in individual countries and (b) such services as may be required in individual countries and as cannot be made available by the governments of such countries". This sum of money is not large considering the number of endemic countries and the very great needs. Fortunately, a number of countries, particularly the Soviet Union and the United States of America, have provided substantial additional assistance. As requested by the World Health Assembly, WHO is endeavouring to co-ordinate all of these efforts, international, bilateral and national to effect the goal of smallpox eradication in the shortest possible time. At present, approximately \$ 10 million is available for this programme under all forms of international assistance. Still, this is not a large sum of money. The endemic countries must themselves place a sufficient priority on the programme in order for the job to be accomplished. Special provision must be made to establish full time supervisory staffs and to eliminate administrative barriers; additional funds are normally required. However, it is to be noted that in all countries, vaccination programmes directed at control of smallpox are presently operative. Use of more efficient techniques, improvement of supervision and a "streamlining" of the operation has in many instances permitted an excellent eradication effort for little more than is being spent for a poor control effort. Illustrative of this point is the fact that in one district in one of the countries in Asia, it was found that more than \$ 1.50 was being spent on vaccinator salaries alone for each vaccination performed. In effective programmes, this cost should be no more than a few cents.

As noted above, WHO is prepared to assist in many ways. A few are elaborated below:

1. Supplies and equipment.
2. Technical personnel.

3. Freeze-dried vaccine.
4. Short-term assistance by Regional and Headquarters WHO staff in programme planning and assessment.
5. Consultants and supplies to augment and improve vaccine production.
6. Publications:
 - a) Handbook for Smallpox Eradication, published in July 1967.
 - b) WHO Smallpox Surveillance Reports, published quarterly - Issue No. 2 was printed on 1 December 1967.
 - c) Requirements for Biological Substances (Smallpox Vaccine) - Technical Report Series No. 323, 1966.
 - d) Report of the Scientific Group on Smallpox Eradication - available in March 1968.
 - e) Manual on Vaccine Production - available in late summer, 1968.
 - f) Manual on Laboratory Diagnosis of Smallpox - available in December 1968.
7. Assistance in the Control of Outbreaks in Non-endemic Countries - a vaccine reserve and jet injectors are now stocked in Geneva and, with technical personnel, are available for immediate dispatch to countries requesting assistance.

V Reports to WHO

In order to follow the progress of the programme and to co-ordinate the many efforts being made throughout the world, WHO is requesting that regular reports be submitted by the endemic countries regarding progress in the vaccination effort and the occurrence of smallpox cases. The reports do not replace but rather augment reports now made under the provisions of the International Sanitary Regulations. The reports requested are described at the back of the Handbook for Smallpox Eradication. Purposefully, they have been designed to be as simple and brief as possible. Supplementary reports describing outbreaks, interesting investigations, etc. are at all times welcome as contributions to the Surveillance Reports.

VI Conclusion

During the Seminar, programmes in a number of countries were described which led to a smallpox-free status and the maintenance of this status at a cost in terms of vaccine and personnel, which is far less than that spent on smallpox control in many endemic countries. Countries in many parts of the world have achieved a smallpox-free status with less trained personnel and more problems in transportation and communication than in the presently endemic Asian countries. Further, the task was accomplished and a smallpox-free status maintained with basic health services which were minimal and, in certain instances, virtually non-existent.

Clearly, the necessary tools and better tools than ever before are available. There are no known technical obstacles. If we fail in this task, the failure must rest with us and with us alone. We must all work together on this task for the presence of smallpox anywhere is a threat to all countries. As a national programme cannot be successful unless all parts of the country participate, so a global programme cannot be effective unless all countries fully and actively participate. The World Health Assembly has asked the Director-General to make the programme of smallpox eradication one of the major objectives of the Organization. It is necessary for each individual country to assign the same importance to smallpox eradication in the own national planning.

As expressed by Dr Gunaratne, President of the last World Health Assembly, in May 1967:

"The eradication of smallpox is within our reach. The achievement of this important undertaking now depends exclusively on our will and determination."