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Progress in Improving the Safety of Injections in the EPI Western Pacific Region

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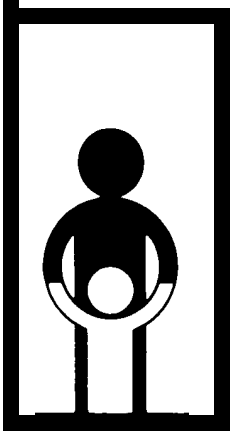

EXPANDED PROGRAMME ON IMMUNIZATION
GLOBAL PROGRAMME FOR VACCINES AND IMMUNIZATION

World Health Organization, Geneva, 1998

PROGRESS IN IMPROVING THE SAFETY OF INJECTIONS IN THE EPI WESTERN PACIFIC REGION

1. Introduction:

The Western Pacific Region has had a plan of action for the improvement of the safety of EPI injections since 1994. Annex 1 provides a summary of progress by country.

2. National plans of action to improve the safety of injections:

Since 1993 national plans of action to improve the safety of injections have been ratified in **Cambodia, Lao People's Democratic Republic**, and **Viet Nam,** and draft national plans/policies have been prepared in **Mongolia, Papua New Guinea** and the **Philippines**. Guidelines for the preparation of national plans of action have been developed for Pacific Island Countries (see Annex 2). The main points covered by these national plans are:

- national policy on the safety of injections, including equipment of choice;
- the establishment of standard acceptable quantities of sterilization and injection equipment at health facility level (either disposable or re-sterilizable);
- the adoption of a minimum replacement period for both sterilization equipment and re-sterilizable injection equipment;
- appropriate training for staff involved in the EPI at all levels;
- the calculation and costing of annual national requirements on the basis of the above standards.

Only one formal evaluation has so far been carried out (in Laos, see Annex 3), but it appears that the plans have had mixed success. Within the next twelve months a further two countries may undertake evaluations of their national plans, (Cambodia, Viet Nam), either as part of larger cold chain and logistics reviews or as separate exercises. The focus of the evaluations is on the level of equipment available at peripheral health facilities, the regularity of replacement of equipment, and the status of training of the staff.

3. Progress by country:

In **Cambodia**, a national plan of action has been ratified since 1995. The plan of action focuses on ensuring a reliable supply of adequate levels of equipment, and training for peripheral staff. A 6 monthly distribution schedule for new equipment has been established.

Lao People's Democratic Republic ratified a national plan of action in 1995, focusing on ensuring adequate and reliable supplies of injection equipment and appropriate training, and the plan is being implemented. The first distribution of equipment under the plan took place in early 1996. Additional resources are being sought to procure equipment. Practices were reviewed during the National EPI Review in 1995, and as a separate review exercise in 1997.

Mongolia is considering a draft national plan of action, and is currently working to secure funds for adequate supplies of syringes and needles for EPI use.

Pacific Island Countries have covered safety of injections during workshops for national EPI managers in 1996 and 1997. Autodestruct syringes and safety boxes are being introduced for the first time to several countries as a result of measles campaigns in 1997/98. There is a chance that safety boxes will be adopted for routine use in several countries in 1998.

Papua New Guinea has a draft cold chain and logistics policy which includes a section on injection practices. Autodestruct syringes and safety boxes were used in 1997 during the combined polio and measles NIDs.

In the **Philippines**, progress has been made towards ensuring safe EPI injections. A draft national policy for EPI cold chain and logistics includes a section on injection practices, and there are efforts to standardize the supply of safety boxes. The Department of Health is committed to centrally providing syringes and needles from the government's budget. A budget line has been established to procure enough disposable syringes and needles to implement the national policy of one sterile syringe and one sterile needle for each injection each year. Adequate budgetary provision has been made for disposable syringes and needles and safety boxes for proposed measles campaigns in 1998/99.

Vietnam ratified a national plan of action in 1996. Additional equipment is being purchased, although not yet enough to ensure 100% safe injections, and further funds are being sought. The use of disposables is becoming increasingly widespread, particularly in the south. Improvement of injection safety has been a major focus of recent national and regional EPI workshops. The MOH wants to conduct an evaluation of the impact of the national plan in 1998.

In **China** the priority accorded to safe injections has increased. Locally produced double rack portable medical steam sterilizers have been successfully field tested. These steam sterilizers are now listed in the PIS. A variation of this sterilizer which is designed for sterilization at high altitudes is currently proposed for field testing. Racks have been developed for these sterilizers to fit both EPI and curative syringes and needles to ensure maximum use, and efforts have been made to use them for sterilization of birthing kits.

A World Bank loan has funded adequate quantities of steam sterilizers and reusable syringes and needles to ensure EPI safe injections in 10 provinces with a population of about 400 million. In about 300 other counties, adequate quantities of steam sterilizers and needles and syringes have been purchased for mass TT campaigns, as part of neonatal tetanus elimination activities, with funds from AusAID, UNICEF, and WHO.

3. Field trial of methods of safe disposal and destruction of used disposable injection equipment (autocombustion incinerators):

In the Philippines and Viet Nam, field trials are being conducted to test a range of methods for the safe disposal and destruction of used injection equipment, including autocombustion incinerators. A final report will be produced in 1998. Four groups of health centres have been established in each trial site:

a) using cardboard safety boxes which were transported to province level for incineration in an autocombustion incinerator;

b) using plastic re-usable safety boxes which were transported to province level for incineration of the contents in an autocombustion incinerator;

c) using cardboard safety boxes which were transported to district level for open air incineration;

d) using historical methods of disposal and destruction.

Early results of the trial indicate the following broad conclusions:

a) a system for collection of used syringes and needles in safety boxes, and transport of the safety boxes to a central point for destruction, is feasible

b) the most effective of the methods of destruction tested was open burning of safety boxes at district level;

c) cardboard safety boxes are easier to use and more acceptable than re-usable plastic safety boxes;

d) the autocombustion incinerators tested are not satisfactory for destruction of syringes and needles alone in the field, due to smoke output and leakage of molten plastic.

4. The introduction of autodestruct syringes and safety boxes.

Further to the new global policy on the safety of injections, EPI WPRO has been encouraging countries undertaking mass immunization activities to use autodestruct equipment wherever possible. Autodestructs have now been used in mass campaigns in Mongolia, Laos, Papua New Guinea, and several Pacific Island Countries.

Safety boxes have been introduced along with autodestructs in Papua New Guinea and Pacific Island Countries for measles campaigns, and there is now some pressure for the routine use of safety boxes in these countries. Safety boxes are also planned for introduction into the Philippines for proposed measles campaigns in 1998. There is some interest for the local production of safety boxes in both Viet Nam and the Philippines.

5. The safety of injections in mass campaigns

5.1 Measles and diphtheria campaigns Mongolia and Laos 1995, 1996, and 1997

In Mongolia autodestruct syringes were used for national campaigns against diphtheria, measles, and meningococcal meningitis in 1995 and 1996, but safety boxes were not systematically used and no central system of destruction was implemented. In Laos autodestructs were used for initial provincial diphtheria campaigns in 1996, but lack of funds forced a switch to ordinary disposables for three provinces covered later. Safety boxes were not routinely used and no central system of destruction was implemented.

5.2 TT campaigns, China, 1995, 1996, 1997

Re-usable (glass) syringes and needles, and new steam sterilizers were provided for TT campaigns in 300 counties. A review conducted in 1997 found that injection safety in the campaigns was considerably better than in routine EPI and curative activities, however it was noted that up to 40% of village clinics visited continued to follow unsafe practices, such as changing the needle but not the syringe. The main problem seemed to be lack of knowledge rather than lack of equipment. Increasing numbers of village clinics were using the sterilizers supplied both for routine EPI injections and for curative injections.

5.3 Measles campaigns Papua New Guinea, Pacific Island Countries 1997, 1998

Autodestruct syringes and safety boxes have been used in all campaigns except Kiribati, where supplies were delayed and ordinary disposables used. Both the syringes and safety boxes have been very well received and national EPI programmes are very receptive to the use of safety boxes for routine activities. Some effort has been made to collect safety boxes and destroy them centrally, particularly in Fiji. “Bundling” of syringes, safety boxes, and vaccine had mixed success; syringes and safety boxes tended to be shipped together, but separately from vaccines.

5.4 Measles campaigns Philippines 1993, 1994 and planned for 1998/99

Measles campaigns as part of polio NIDs in 1993 and 1994 were carried out using ordinary disposables and no safety boxes. No plan for central destruction was developed, but adequate syrinegs and needles were available. For planned measles campaigns in 1998/99, adequate syrinegs, needles, and safety boxes have already been ordered. A plan for central destruction is being developed, the first step of which is an inventory of incinerators which has been carried out by DOH.

In summary, different injection strategies have been used in campaigns in different countries, depending on the availability of equipment, sources of donor support, etc. In general safety of injections in campaigns has been improving through better planning and increased use of autodestructs and safety boxes. A major gap remains the development of plans for the collection and destruction of used equipment.

6. Conclusions and major issues

The major conclusions which can be drawn from developments on the safety of injections in WPR include:

- the development of national plans of action to improve injection safety has had mixed success in terms of implementation and needs further follow up
- the use of disposables in most countries is becoming more widespread and in the long term it will not be possible to control their continued use for immunization
- the focus should now be on the introduction of methods of safe disposal (safety boxes) and safe destruction; there remains a need for a reliable, cheap, effective incinerator for use at province or district level
- injection safety in campaigns has been improving through better planning and increased use of autodestructs and safety boxes, but a major gap remains the development of plans for the collection and destruction of used equipment
- strategies to improve the safety of injections will vary depending upon the situation of individual countries; in WPR we now operate on the matrix attached as Annex 4

Actions for consideration:

- **Progress in implementing national plans to improve the safety of EPI sterilization and injections practices should continue to be evaluated.**
- **The use of safe disposal boxes should be strongly promoted for all EPI activities where disposables (including autodestructs) are used.**
- **Further efforts should be made to identify and field trial appropriate incinerators.**
- **Plans for all campaigns using injectables must include clear consideration of injection safety, including calculations of requirements, the use of safety boxes where appropriate, and plans for the destruction of used equipment.**
- **Operations on injection safety should reflect the situation of individual countries in order to achieve maximum benefit.**

ANNEX 1.

STATUS OF IMPLEMENTATION OF REGIONAL PLAN OF ACTION TO ENSURE THE SAFETY OF EPI INJECTIONS BY THE YEAR 2000, 1992 - 1997

CRITERIA	CAM	CHN	LAO	MOG	PICs	PNG	PHL	VTN
1. Injection practices survey or evaluation done	YES	YES	YES	NO	NO	YES	YES	YES
2. National plan drafted	YES	NO	YES	YES	NO	NO	YES	YES
3. Adequate resources identified nationally for injection and sterilization equipment	YES	NO	YES	NO	YES	NO	YES	NO
4. Disposables used in routine EPI	NO	NO	NO	NO	YES	YES	YES	YES
5. Safe disposal and destruction adequately addressed	NO	NO	NO	NO	NO	NO	NO	NO
6. In-service training recently conducted including safe injections	YES	PARTLY	YES	NO	NO	NO	YES	YES
7. Adequate monitoring of stocks.	NO	NO	NO	NO	NO	NO	NO	NO
8. Evaluation of national plan of action done	NO	N/A	YES	N/A		N/A	NO	NO

N/A = Not applicable

ANNEX 2. GUIDE FOR DEVELOPING A NATIONAL PLAN OF ACTION FOR INJECTION SAFETY

Plans of action need to include the following important areas:

- objectives and strategies;
- national policy on the type of injection equipment to be used;
- estimates of the annual equipment requirement for the whole country, by local government area, and the cost of this equipment;
- a distribution schedule for the equipment;
- national policy on disposal of used equipment, and where applicable a plan for the recovery of used syringes and needles from health centre level for destruction at higher levels.

(1) Objective and strategies of national plans

Objective: To ensure safe injection practices in the EPI by the year 2000.

Strategies:

(a) Establish reliable estimates of equipment requirements, minimum stock levels and effective supply and distribution systems for sterilization and injection equipment.

(b) Institute monitoring and supervision procedures to ensure adequate supplies at all levels and correct practices by health workers.

(c) Improve training of health workers and managers on correct sterilization and immunization procedures.

(d) Ensure safe disposal of used injection equipment.

(2) Choosing injection equipment

Plans should specify the national policy on injection equipment. There are two main types of injection equipment in use, syringes and needles which can be resterilized and used again (reusable equipment) and syringes and needles which are intended for one use only and which must be discarded after use (disposable equipment). One type of disposable equipment which should be considered as a category on its own is autodestruct equipment, which can only be used once because the syringe needle combination inactivates itself after use.

Reusable equipment:

Advantages - it is comparatively cheap, it only needs to be supplied once or twice a year, and because used equipment can be sterilized and used again, there should always be enough syringes and needles for every immunization session.

Disadvantages - if the equipment is not sterilized properly before being used it leads to unsafe injections, extra equipment such as steam sterilizers is necessary to ensure safe injections, health workers need to be trained in how to sterilize properly, and the sterilization process takes time and effort from the health workers.

Logistics issues - it is necessary to establish minimum equipment levels (the number of syringes and needles, type of sterilizer, and spare parts which should be available at all health facilities) and a minimum replacement period to be able to calculate annual requirements.

Disposable equipment:

Advantages - it is easy and convenient to use for health workers, if used correctly there is no risk of unsafe injections, it is frequently easy to get commercially as well as through the health system.

Disadvantages - if reused this equipment is a major source of unsafe injections, because there can only be one syringe and needle for each injection supply is a major issue, it is comparatively more expensive, even if properly used there is a major problem with disposal.

Logistics issues - annual requirements need to be carefully calculated and budgeted for to avoid shortfalls and reuse, and a distribution plan detailing frequency of distribution is very important.

Autodestruct equipment:

Advantages - it is easy and convenient to use for health workers, and because it cannot be reused it makes it much less possible to give unsafe injections, it is the safest of all injection equipment.

Disadvantages - it is much more expensive than other alternatives, and there is a major problem with disposal as for normal disposables.

Logistics issues - as for disposables, requirements need to be carefully calculated and good distribution plans developed, because shortfalls may lead to delays in immunization activities.

Currently WHO and UNICEF recommend autodestruct equipment as the safest kind of injection equipment for immunizations. Previously WHO and UNICEF have recommended reusable injection equipment for the EPI, and this equipment is still acceptable if it is well monitored. However, in many countries ordinary disposable injection equipment is in widespread use, and once use is established it is difficult to return to reusables. We have to be practical about the choice of injection equipment depending upon the circumstances in each country.

(3) Calculating annual requirements

This is a vital part of planning to ensure safe injection practices no matter what kind of equipment is being used. **All plans of action should include spreadsheet calculations of the quantity of equipment required each year, by administrative area (province or local government council or district).** Examples of spreadsheets for reusable and disposable equipment are attached. The calculation methods are very simple.

Reusable equipment: Minimum equipment level x number of health centres x number of times of replacement each year

Disposable equipment: Number of injections per year x wastage factor

(4) Disposal of used equipment

Disposal is one of the most important issues for safety of injections in Pacifc island countries. It is not uncommon to find used syringes and needles in places where people can easily come into contact with them. The problem is most serious for ordinary disposable syringes and needles, but it can also be a problem for reusables and autodestructs.

Plans must specify the approved way of ensuring that used syringes and needles are disposed of properly, in safe containers, and then properly destroyed. Used disposable syringes and needles can be collected in safety boxes to ensure that they are kept safe prior to destruction. The best way to destroy used syringes and needles is to burn them in an incinerator. The problem is that most dispensaries and health centres do not have an incinerator. This may mean that used syringes and needles have to be sent from health centres to district or regional hospitals to be destroyed. **Plans should identify the places where incinerators are placed or where they should be placed, and which facilities should send used equipment to each incinerator for destruction.** The only real alternative to burning in a proper incinerator is ordinary burning and burying. Just burying equipment is not recommended. Incinerator boxes can be used to burn syringes at health centre level, but the residue must still be buried.

(5) Indicators to monitor injection practices and supplies

Adequacy of syringe and needle supplies at health facility level
- frequency of deliveries of supplies to each facility (at least once each year)
- minimum quantities required/quantities delivered

Correct use of steam sterilizers (where appropriate)
- proportion of facilities provided with steam sterilizers
- proportion of facilities with staff trained in the use of steam sterilizers
- proportion of facilities provided with adequate supplies of spare parts
- proportion of facilities where steam sterilizers are observed to be correctly used (using TST spots if appropriate).

Disposal of old equipment:
- availability of accessible safe incinerators
- availability of safety boxes or incinerator boxes at health centre level
- presence of used syringes and needles in garbage, or close to health centres

Sterile injections:
- number of abscesses following injection reported.

An example checklist for supervisors to assist them in assessing sterilization and injection practices is attached.

(6) Management

National plans should designate responsible officers. At national and regional level one or more officers should be designated as responsible for EPI cold chain and logistics. Ideally these officers should also be responsible for operational aspects of the EPI since cold chain, logistics, and operations are closely linked. These officers will be responsible for managing the system, ensuring adequate supplies and equipment are available at all levels, calculating requirements, maintaining inventories, etc.

(7) Training requirements

National plans should include a section on training requirements. The objective of training should be to ensure that health workers are able to:

- correctly use a steam sterilizer and reusable syringes and needles, or disposable syringes and needles, or autodestructs as per national policy.
- routinely report on equipment and supply levels to EPI managers.
- appropriately dispose of used equipment.

Training should be done as part of other EPI or PHC training and should involve two steps. Initially, a training session for supervisory staff should be held, to re-familiarize them with the use of the appropriate type of injection equipment and the method of disposing of used equipment, as well as calculation of requirements and the monitoring of stocks.

The second step is for supervisory staff to train a minimum of one health worker from each unit providing immunization on correct sterilization and injection techniques, on minimum stock requirements, and on reporting stock balances. Simple guidelines should be developed (including in poster form) to describe the step-by step use of the steam sterilizer and the dangers of incorrect sterilization and injection procedures, where appropriate.

(8) Budget

A budget should be developed as part of the national plan of action, to include the annual cost of equipment, the cost of disposal where appropriate, and the cost of training.

CHECKLIST FOR EPI SUPERVISORS
STERILIZATION AND INJECTION PRACTICES

District : _____ Date : / /

Health Centre : _____ Population _____

1. Does the centre have an adequate number of syringes and needles?

0.5 ml syringes ___
0.1 ml syringes ___
23g needles ___
26 g needles ___

2. Are the syringes and needles in working condition? ___

3. Has the centre received supplies of syringes and needles recently? ___
If yes, when? _____

4. What is the method used for disposing of used syringes and needles:

throw in the garbage ____
bury in pit ____
burn and bury ____
burn using incinerator box ____
send used units to hospital for burning in an incinerator ____
other ____

5. If reusable injection equipment is used:

does the centre have a working steam sterilizer? ___
is the sterilizer being regularly used? ___
are there spare parts for the sterilizer ?
spare gaskets ___
spare valves ___

6. Have any staff in the centre been trained in the correct way to steam sterilize reusable syringes and needles? ___
If yes, how many staff _____ When were they trained _____

Comments and conclusions:

Supplies required:

Annex 3.

Summary of conclusions and recommendations
Evaluation of implementation of the National Plan to Improve the Safety of EPI Injections, Lao PDR

Conclusions

- Progress has been made in implementing the national plan of action at central, provincial and local levels since 1995.
- The quantities of sterilizers, syringes and needles were generally adequate for fixed sites and mobile teams. However, syringes and needles were overstocked at provincial and district stores in one of the review provinces.
- Standard methods for estimates of injection and sterilization equipment were not properly used for estimation of requirements or distribution of equipment by central and provincial EPI teams.
- An EPI officer was appointed to be responsible for the monitoring injection safety and supplies in all provinces and districts visited, but the knowledge and skills of the officer often did not meet the actual requirements.
- The knowledge of vaccinators on safe injection and sterilization was sufficient, although they obtained basic knowledge from different sources.
- The system for monitoring sterilization and injection equipment supplies was not instituted at all levels.
- The system of collection and destruction of used injection equipment was not instituted in all provinces.
- Disposable needles have began to be widely used for EPI injections in urban areas and use is spreading to rural areas.

6. Recommendations

- Distribution plans for sterilization and injection equipment should be developed for all provinces by district and the first distribution of equipment according to the plan should be carried out in December 1997.
- The system of monitoring and reporting on sterilization and injection practices should be instituted and implemented in all districts and provinces in 1998.
- Training of vaccinators and EPI managers on correct sterilization and injection technique should be continued to refresh old staff and familiarize new staff through regular EPI training courses.
- National policy should be reviewed to cover the use of disposable needles and syringes for immunizations.
- Specific and practical guidelines should be developed for the disposal of used syringes and needles. The system of collection and disposal of used syringes and needles indicated in the plan of action should be modified to be more practical according to the current situation.

Annex 4. Strategies for the improvement of injection safety according to country circumstances

Category of countries	**Routine EPI**	**Campaigns**
Small developing (PICs, PNG, Laos, Cambodia, Mongolia)	1. If disposables used: a) standardize on autodestructs b) introduce safety boxes for routine use (all injections) c) collection and central destruction (province/district) 1. If re-sterilizables used: a) standardize minimum quantity and frequency of replacement (needles, syringes, sterilizers)	1. Standardize on use of autodestructs 2. Safety boxes mandatory 3. Collection and central destruction
Larger developing (Philippines, Viet Nam)	1. If disposables used: a) introduce safety boxes for routine use b) collection and central destruction 1. If re-sterilizables used: a) standardize minimum quantity and frequency of replacement (needles, syringes, sterilizers)	4. If disposables used: a) safety boxes mandatory b) collection and central destruction 1. If re-sterilizables used: a) maximum session size limited to capacity to sterilize b) campaign planned to be spread out over days or weeks
Very large developing (China)	1. Re-sterilizables a) standardize minimum quantity and frequency of replacement (needles, syringes, sterilizers)	1. Re-sterilizables a) maximum session size limited to capacity to sterilize b) campaign planned to be spread out over days or weeks