Immunization Handbook for Medical Officers

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Published by: Department of Health and Family Welfare, Government of India
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We welcome and encourage your suggestions for improving the Immunization Handbook for Medical Officers.

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Selected Acronyms

ADS	Auto Disable Syringe
AEFI	Adverse Event Following Immunization
AFB	Acid Fast Bacilli
AFP	Acute Flaccid Paralysis
AIDS	Acquired Immune-Deficiency Syndrome
ANC	Ante Natal Care
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
AVD	Alternate Vaccine Delivery
AWC	Anganwadi Center
AWW	Anganwadi Worker
BCG	Bacillus of Calmette and Guérin
BMO	Block Medical Officer
CBO	Community Based Organization
CFR	Case Fatality Rate
CIF	Case Investigation Form
CHC	Community Health Center
CMO	Chief Medical Officer
CNA	Community Needs Assessment
CPCB	Central Pollution Control Board
CS	Civil Surgeon
CSSM	Child Survival and Safe Motherhood
DF	Deep Freezer
DH	District Hospital
DIO	District Immunization Officer
DIR	Detailed Investigation Report
DOTS	Directly Observed Treatment Schedule
DT	Diphtheria Tetanus
DPT	Diphtheria Pertussis and Tetanus
ECR	Eligible Couple Register
EEFO	Earliest-Expiry-First-Out
EPI	Expanded Program on Immunization
ERT	Epidemic Response Team
FAQ	Frequently Asked Question
FDA	Food and Drug Administration
FIFO	First-In-First-Out
FIR	First Information Report
GoI	Government of India
HW	Health Worker
HepB	Hepatitis B
HIV	Human Immunodeficiency Virus

IACC	Inter-Agency Coordination Committee
ICC	Investigator cum Computer
ICDS	Integrated Child Development Scheme
ID	Intra-Dermal
IEC	Information Education and Communication
ILR	Ice-Lined Refrigerator
IM	Intra-Muscular
IO	Immunization Officer
IPC	Inter-Personal Communication
IU	International Unit
JE	Japanese Encephalitis
JSY	Janani Suraksha Yojana
MNT	Maternal and Neonatal Tetanus
MNTE	Maternal and Neonatal Tetanus Elimination
MO	Medical Officer
MoHFW	Ministry of Health and Family Welfare
NFHS	National Family Health Survey
NGO	Non-Governmental Organization
NIDs	National Immunization Days
NIS	National Immunization Schedule
NRHM	National Rural Health Mission
OPV	Oral Polio Vaccine
ORT	Oral Rehydration Therapy
PHC	Primary Health Center
PIR	Preliminary Investigation Report
RI	Routine Immunization
RIMS	Routine Immunization Monitoring System
RIT	Regional Investigation Team
RNTCP	Revised National Tuberculosis Control Program
SC	Sub-Center
SHG	Self Help Group
SIO	State Immunization Officer
SIA	Supplementary Immunization Activity
TB	Tuberculosis
TBA	Trained Birth Attendant
TSS	Toxic Shock Syndrome
TT	Tetanus Toxoid
UHC	Urban Health Center
UIP	Universal Immunization Program
VPD	Vaccine Preventable Disease
VAD	Vitamin A Deficiency
VAPP	Vaccine Associated Paralytic Poliomyelitis
VVM	Vaccine Vial Monitor
WMF	Wastage Multiplication Factor

Glossary

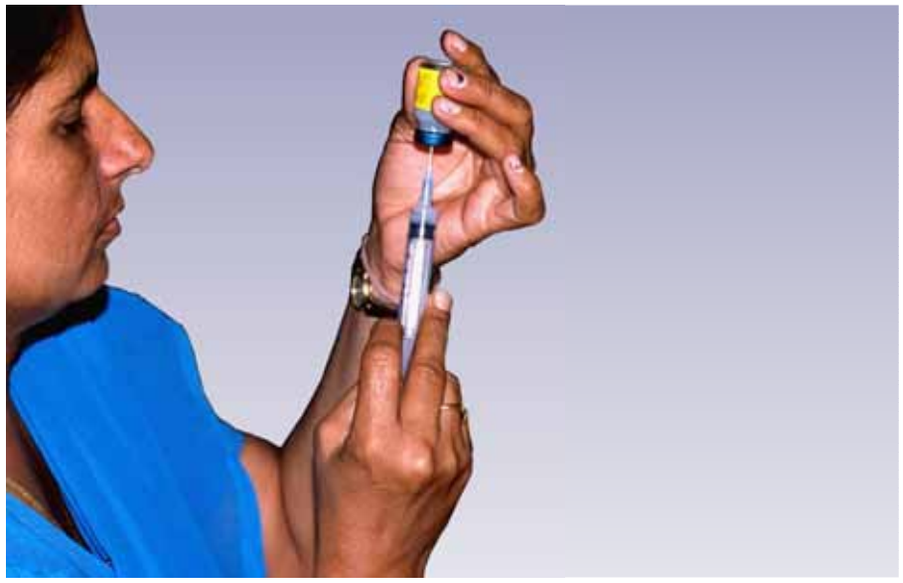
AEFI	A medical incident that takes place after an immunization, causes concern and is believed to be caused by immunization.
Bundling	Supplying vaccines with diluents, droppers, AD syringes and reconstitution syringes, in corresponding quantities.
Case Fatality Rate	The proportion of individuals contracting a specific VPD who die of that VPD. The number of patients who die of a specific VPD X 100 Total number of cases of the same VPD
Cold Chain	The system of storing and transporting the vaccines at recommended temperatures from the point of manufacture to the point of use.
Cold Chain Sickness Rate	The proportion of cold chain equipment out of order at any point of time. It should be kept to the minimum acceptable level of less than 2%.
Completeness of reporting	The number of reports received divided by the number of reports expected, expressed a percentage. Reports received x 100 Reports expected
Confirmed VPD	A VPD case that is laboratory confirmed or that meets the clinical case definition and is epidemiologically linked to a confirmed or probable case.
Down time	The time between the breakdown of equipment and its repair or the period for which an equipment remains out of service
Dropout Rate	Proportion of children who receive one or more vaccinations but do not return for subsequent doses. DPT1 cumulative total minus DPT3 cumulative total x 100 DPT1 cumulative total
Dropouts	Children who receive one or more vaccination but do not return for subsequent immunization
Excess Stock	Stock more than the requirement for one month, including the buffer stock (i.e. more than 125% for vaccines and 110% for syringes).
Feedback	The process of routinely sending analysis and reports to the peripheral levels of the reporting system.
Feed-forward	The reverse of feedback, it is the process of forwarding surveillance and other monitoring data to higher levels.
Float assembly	The stock of spare units of cold chain equipment (at district/state headquarters) for immediate replacement of defective units (brought from the Primary Health Centers).
Fully Immunized	An infant who has received BCG; three doses of DPT, OPV and Hepatitis B; and Measles before one year of age
Holdover time	The time taken for increasing the cabinet/storage temperature of vaccines at the time of power failure from its minimum range to its maximum range, subject to the condition that the equipment is functioning well.

Inadequate Stock	Stock less than the buffer stock (i.e. less than 25% for vaccines and 10% for syringes).
Lead time	The time between ordering of new stock and its receipt.
Left-outs	Beneficiaries who do not utilize the immunization services for reasons including lack of knowledge, trust in immunization services or geographic and other reasons.
Logistics management	The cyclical process of demand estimation, indenting, receipt, storage and distribution of vaccines and other supplies to health facilities in a timely fashion and at an optimum cost.
Maximum stock level	The largest amount of stock that you should have, usually expressed as the number of weeks/months of supply.
Minimum stock level	The least amount that you should have in stock or the level which, when reached, initiates a re-order; usually expressed as the number of weeks/months of supply. Also known as the re-order level.
Outbreak	The occurrence of an illness in a community, clearly in excess of the expected numbers.
Probable VPD	Diagnosis of a VPD based on history and clinical examination.
Response Time	The period between sending information regarding breakdown to actually attending to it.
RIMS	A computer-based monitoring system that facilitates the entey of regular and timely immunization data from the PHC/block level to district, state and national levels and generates analytical reports.
Stockout	A condition when no stock is available of a vaccine or other supply.
Surveillance of VPDs	The ongoing and systematic collection, analysis, interpretation, and dissemination of data about cases of a disease and factors influencing disease behavior, which is used as a basis for planning, implementing and evaluating disease prevention and control activities, including immunization.
Suspect VPD	Diagnosis of a VPD based on history alone.
Timeliness of reporting	The number of reports received on time divided by the number of reports expected, expressed a percentage. $\frac{\text{Reports received on time}}{\text{Reports expected}} \times 100$
Unsafe Injection	An injection that can potentially harm the recipient, the health worker or the community.
Vaccine efficacy	The ability of the vaccine to prevent disease effectively. It is influenced by the age at immunization, potency of the vaccine at the time of administration (quality of cold chain) and overall immunization coverage levels.
Wastage multiplication factor	The mathematical derivative used to account for the correct amount needed for an immunization session, taking into account the existing wastage rate.
Wastage rate	The proportion (%) of vaccine and other supplies that are wasted due to a variety of reasons to that which was appropriately used (i.e. number of infants vaccinated).

Preface

This handbook has been written for Medical Officers at district, block and PHC levels. Our intention is to provide information that is practical as well as technically and operationally sound. For readers who would like to explore topics in greater depth, we have provided additional references.

India's Immunization Program has undergone a number of significant changes in recent years. These include a new policy environment (the National Rural Health Mission), new vaccines (e.g. hepatitis B and Japanese Encephalitis), new procedures to solve old problems (e.g. injection safety) and new technologies for vaccine delivery and cold chain. Such changes underscore the need for



Medical Officers and Health Workers need to be familiar with the new developments in the Immunization Program.

constant attention, sharing of experience, creativity, and flexibility in responding to problems.

In developing this handbook, we have tried to incorporate material from existing national and international guidelines and feedback from a variety of stakeholders from the central and state governments, training institutions, and international agencies working in the field of Routine Immunization (RI).

A central theme of this handbook is that there is not just one way of doing things. We provide Medical Officers with scientifically-based principles and standards, technical specifications for vaccines and equipment, and operational considerations that they must weigh to devise the best solutions for their circumstances. We have drawn on real life experiences to illustrate how technical and operational issues can be addressed in the field in order to protect every Indian child.

The fact that Immunization gives each child a minimum of four contacts with the health system before the age of one year is a tremendous opportunity that is often underutilized.

We view Routine Immunization, the provision of a primary series of vaccines in the first year of life, as the cornerstone of other primary health care efforts. The fact that immunization gives each child a minimum of four contacts with the health system before the age of one year is a tremendous opportunity that is often underutilized. While the impact of immunization on childhood morbidity and mortality has been great, its full potential has yet to be reached. Thousands of children in India still die from vaccine-preventable diseases each year. It is our fervent hope that this handbook will assist those responsible for

immunization programs to meet this challenge. The protection of children, a task every health care provider takes on, is a high calling. If this handbook can make that task a little easier, then the effort to prepare it has been worthwhile.

While Routine Immunization has played a significant role in preventing childhood deaths and disability, thousands of children in India continue to die from vaccine-preventable diseases each year.

UNIT 1

Introduction and Overview of UIP

LEARNING OBJECTIVES

1. To explain the importance of immunization
2. To describe the milestones of the Immunization Program in India
3. To list the responsibilities of Medical Officers in Routine Immunization

Vaccines provide active immunity to the body by stimulating the immune system which produces antibodies against disease-producing organisms. Vaccines can be divided into two types, live attenuated and killed formulations.

Vaccines stimulate the body's immune system, which produces antibodies against disease producing organisms. Vaccines can either be live attenuated or killed.

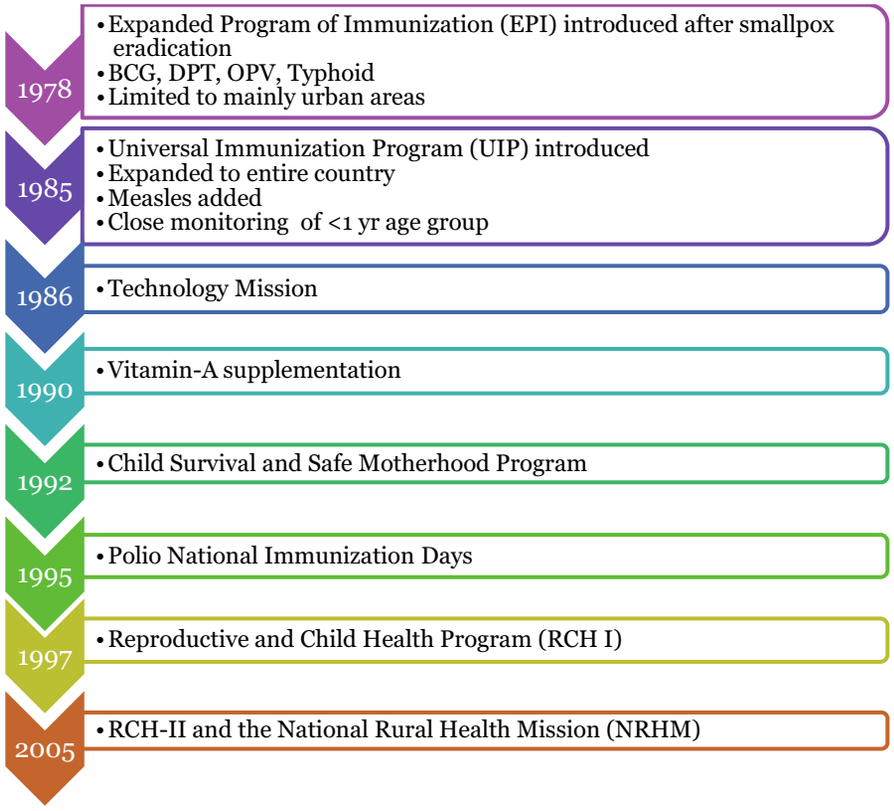
The live attenuated vaccines are derived from disease-causing viruses or bacteria that have been weakened under laboratory conditions. They replicate in a vaccinated individual, but because they are weak, they cause either no disease or only a mild form of the disease. Examples are BCG, Measles and the Oral Polio Vaccine. Inactivated or killed vaccines, on the other hand, are produced by viruses or bacteria and then inactivated with heat or chemicals. They cannot grow in a vaccinated individual and so cannot cause the disease. They are less effective than live vaccines, requiring multiple doses for full protection as well as booster doses to maintain immunity.

Examples are whole-cell (pertussis); fractional protein based (diphtheria toxoid and tetanus toxoid) and recombinant (hepatitis B) vaccines.

These vaccines vary in efficacy, according to the age at which the vaccine is administered and the number of doses given. For example, the measles vaccine is 85% effective at the age of 9 months and three doses of DPT provide over 95% protection against diphtheria, 80% against pertussis and 100% against tetanus.

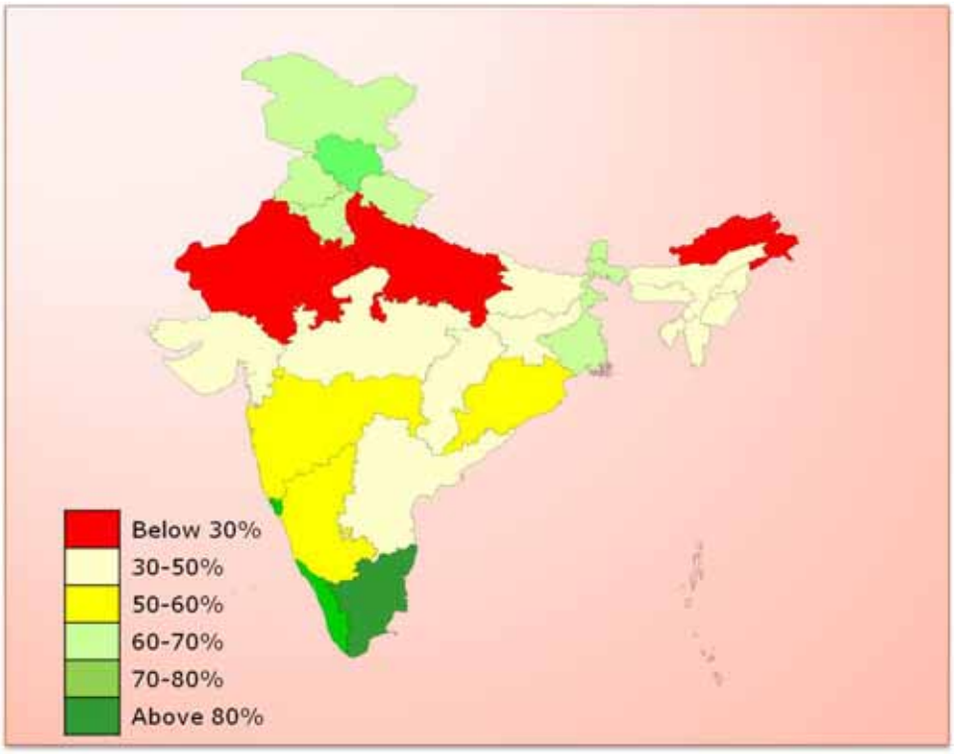
Routine Immunization is one of the most cost effective public health interventions and was first introduced in India in 1978.

Milestones in the Immunization Program in India



Routine Immunization is one of the most cost effective public health interventions and was first introduced in India in 1978. Yet, despite the concerted efforts of the government and other health agencies, a large proportion of vulnerable infants and children in India remain un-immunized. India has the highest number (approximately 10 million) of such children in the world.

The ***National Family Health Survey*** (2005-06) reports that only 43.5% of children in India received all of their primary vaccines by 12 months of age. There is a wide variation among states, and states with poorer immunization coverage have higher child mortality rates.



The National Family Health Survey (2005-06) reports that only 43.5% of children in India received all of their primary vaccines by 12 months of age.

Strengthening Immunization under NRHM

- Introduction of Auto Disable (AD) syringes and hub cutters.
- Support for alternate vaccine delivery to session sites from the last storage point
- Mobility support to State and District Immunization Officers and other supervisory staff
- Alternate vaccinators for sessions in urban slums and under-served areas, including vacant SCs.
- Mobilization of children and pregnant women by ASHA/link-workers to increase coverage, decrease dropouts and for convergence of Nutrition with Immunization

ASHAs/Link Workers provide critical support in mobilizing and tracking beneficiaries for immunization.

- Biannual RI review meetings at national and state levels
- Computer Assistants for every district and at state
- Routine Immunization Monitoring System (RIMS)
- Decentralized printing of recording, reporting and monitoring tools (e.g. Immunization cards, monitoring charts, tracking bags, temperature charts)
- Miscellaneous (e.g. polythene bags, POL for generators etc.)
- Strengthen cold chain maintenance and expansion
- Strengthen vaccine management

Responsibilities of Medical Officers in Routine Immunization

Planning

- Guide Health Workers to analyze their data, identify bottlenecks/constraints and prepare micro-plans
- Prepare Block micro plan based upon Sub-Center microplan
- Prioritize health facilities or areas (e.g. hard to reach) for additional support.
- Regular review and update of microplans
- Ensure that all health facilities display a map of the respective areas with population covered, session plan and work-plan
- Ensure that signboards are placed for the session sites
- Plan for monitoring and supervision
- Plan for IEC

Cold chain and logistics management

- Ensure monthly visit from district HQ cold chain store for monitoring.
- Maintain and monitor cold chain and manage vaccine stock & logistics of PHC/CHC.
- Ensure that sufficient vaccines and supplies are available for all sessions
- Ensure regular distribution of vaccines and supplies to ANM/HW at outreach session sites through Alternate Vaccine Delivery system

Supervision, Monitoring, and Surveillance

- Ensure planned outreach sessions are implemented even if HW is on leave by making alternate arrangements.
- Establish a system to aggregate and review SC monthly reports and prioritize for support.
- Ensure reporting of VPD and AEFI cases in the monthly reports.
- Send complete report to the district on time. Give update on the progress of the activity during monthly meeting in district HQ
- Ensure the use of simple monitoring tools such as coverage monitoring chart, supervision checklist, tracking bags etc.
- Prepare a supervisory schedule for visits and regular meetings for follow up with each health facility.
- Provide on job training and solve issues on spot as often as possible
- Maintain supervisory log book at PHC and sub-centers
- Conduct monthly/fortnightly review meeting of HWs
- Organize inter-sectoral coordination meetings at PHC to coordinate with ICDS, local village administration and NGOs

Community Involvement and Communication

- Support SC staff in establishing regular dialogue with community (IPC)
- Establish alliances with programs (e.g. ICDS) and organizations (e.g., NGOs) with community reach.
- Meet community/Panchayat leaders, teachers and volunteers on a regular basis; inform them to tell about immunization in their meetings; give them some handouts with immunization information to be disseminated
- Get feedback from the community to ensure a high quality service.
- Activate network to publicly announce arrival of ANM
- Monitor tracking of newborns and dropouts and ensure that due list is shared with ASHA and AWW.

Financial management

- Ensure timely release of funds to the health centers.
- Maintain records of payment to porters for alternate vaccine delivery, payment to social mobilizers and of JSY wherever applicable.
- Keep record of all funds received and expenditure incurred with vouchers under various heads.
- Monitor timely dispersal of funds at grass root level.
- Send the statement of expenditure and utilization certificate to the district.

UNIT 2

Immunization Schedule and Frequently Asked Questions

LEARNING OBJECTIVES

1. To identify and list vaccines administered in the National Immunization Program, the ages at which they are given, the number of doses along with the site and route of administration
2. To explain the answers to the Frequently Asked Questions on the Immunization Schedule

National Immunization Schedule (NIS) for Infants, Children and Pregnant Women

Vaccine	When to give	Dose	Route	Site
For Pregnant Women				
TT-1	Early in pregnancy	0.5 ml	Intra-muscular	Upper Arm
TT-2	4 weeks after TT-1*	0.5 ml	Intra-muscular	Upper Arm
TT- Booster	If received 2 TT doses in a pregnancy within the last 3 yrs*	0.5 ml	Intra-muscular	Upper Arm
For Infants				
BCG	At birth or as early as possible till one year of age	0.1ml (0.05ml until 1 month age)	Intra-dermal	Left Upper Arm
Hepatitis B	At birth or as early as possible within 24 hours	0.5 ml	Intra-muscular	Antero-lateral side of mid-thigh
OPV-0	At birth or as early as possible within the first 15 days	2 drops	Oral	Oral
OPV 1,2 & 3	At 6 weeks, 10 weeks & 14 weeks	2 drops	Oral	Oral
DPT1,2 & 3	At 6 weeks, 10 weeks & 14 weeks	0.5 ml	Intra-muscular	Antero-lateral side of mid thigh
Hepatitis B 1, 2 & 3****	At 6 weeks, 10 weeks & 14 weeks	0.5 ml	Intra-muscular	Antero-lateral side of mid-thigh
Measles	9 completed months-12 months. (give up to 5 years if not received at 9-12 months age)	0.5 ml	Sub-cutaneous	Right upper Arm
Vitamin A (1stdose)	At 9 months with measles	1 ml (1 lakh IU)	Oral	Oral
For Children				
DPT booster	16-24 months	0.5 ml	Intra-muscular	Antero-lateral side of mid-thigh
OPV Booster	16-24 months	2 drops	Oral	Oral
Japanese Encephalitis**	16-24 months with DPT/OPV booster	0.5 ml	Sub-cutaneous	Left Upper Arm
Vitamin A* (2nd to 9th dose)**	16 months with DPT/OPV booster Then, one dose every 6 months up to the age of 5 years.	2 ml (2 lakh IU)	Oral	Oral
DT Booster	5-6 years	0.5 ml.	Intra-muscular	Upper Arm
TT	10 years & 16 years	0.5 ml	Intra-muscular	Upper Arm

*Give TT-2 or Booster doses before 36 weeks of pregnancy. However, give these even if more than 36 weeks have passed. Give TT to a woman in labour, if she has not previously received TT.
** SA 14-14-2 Vaccine, in select endemic districts after the campaign.
*** The 2nd to 9th doses of Vitamin A can be administered to children 1-5 years old during biannual rounds, in collaboration with ICDS.
**** In select states, districts and cities.

Proposed Changes in the National Immunization Schedule: 2009-10

- DT Booster to be replaced by DPT Booster at 5-6 years of age.
- In select well-performing states, MR to be given with DPT Booster at 16-24 months (Dose: 0.5 ml; Route: Sub-cutaneous; Site: Right Upper Arm)
- DPT and HepB vaccines at 6, 10 and 14 weeks to be replaced by DPT-HepB-Hib (Pentavalent) vaccine.

Immunization Schedule Tool

Find out from the Immunisation record or ask the care giver/beneficiary:

For the Pregnant Woman

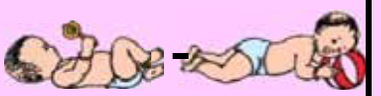
1. How many TT injections received till today?
2. When was the last TT injection received before today?

Doses	Early in pregnancy	At least 1 mth later
TT 1	Give as early as possible in pregnancy	
TT 2		Give at least 1 mth after TT 1
TT Booster	Give if already received at least two TT injections within last 3 years	
Iron Tablets	Take 1 tablet a day for at least 3 mths. Take at least 100 tablets	

For the Infant and Child

1. How old is the child?
2. Which vaccines has the child already received till today?
3. Have at least 4 wks passed since the last DPT, OPV, or HepB was given?







Doses	Birth - 15 days	½ - 1 ½ mths	1 ½ to 9 mths	9 - 12 mths	1- 2 years	5th year	10 & 16 years
OPV 0	Give in first 15 days only						
BCG	Give as early as possible in the first 12 mths						
DPT 1 OPV 1 HepB 1			Give at 1 ½ mths or as soon as possible after 1 ½ mths				
DPT 2 OPV 2 HepB 2			Give at 2 ½ mths or as soon as possible after 2 ½ mths (wait at least 1 mth after DPT 1, HepB & OPV 1 to give DPT 2,HepB & OPV 2)				
DPT 3 OPV 3 HepB 3			Give at 3 ½ mths or as soon as possible after 3 ½ mths (wait at least 1 mth after DPT 2, HepB 2 & OPV 2 to give DPT 3, HepB 3 & OPV 3)				
Measles*				Give at completion of 9 mths/ as soon as possible after completion of 9 mths			
DPT Booster OPV Booster					Give at16 mths (wait at least 6 mths after OPV3 & DPT3)		
DT**						Give at 5 years or school entry	
TT***							Give at 10 and 16 years
Vitamin A				Give at 9 mths with Measles, 16 mths with DPT Booster and then 1 dose every 6 mths till 5 years of age			

* If a child does not receive Measles before 12 mths of age, give a dose as soon as possible before 5 years of age.

** If a child does not receive any DPT till 2 years of age, give two doses of DT one mth apart as soon as possible, along with OPV.

*** If no DPT / DT is given till 5 years of age, give 2 doses of TT one mth apart as soon as possible.

Frequently Asked Questions on the National Immunization Schedule

BCG vaccine

Why give BCG vaccine only on the left upper arm?

BCG is given on the left upper arm to maintain uniformity and for helping surveyors in verifying the receipt of the vaccine.

Why do we give 0.05ml dose of BCG to newborns (below 1 month of age)?

This is because the skin of newborns is thin and an intra-dermal injection of 0.1ml may break the skin or penetrate into the deeper tissue and cause local abscess and enlarged axillary lymph nodes.

Why is BCG given only up to one year of age?

Most children acquire natural clinical/ sub-clinical tuberculosis infection by the age of one year. This too protects against severe forms of childhood tuberculosis e.g. TB meningitis and miliary disease.

If no scar appears after administering BCG, should one re-vaccinate the child?

There is no need to revaccinate the child even if there is no scar.

OPV

Till what age can a child be given OPV?

OPV can be given to children till 5 years of age.

Can OPV and vitamin A be given together with DPT-Booster dose?

Yes.

Can an infant be breastfed immediately after OPV?

Yes.

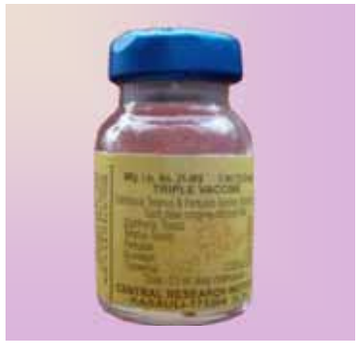
DPT / DT VACCINE

If a child could not receive DPT1, 2, 3 and OPV 1, 2, 3 according to the schedule, till what age can the vaccine be given?

The DPT vaccine can be given until 2 years of age and OPV can be given till 5 years of age. If a child has received previous doses but not completed the schedule, do not restart the schedule and instead administer the remaining doses needed to complete the series.

If a child comes between the ages of 2 to 5 years without having received any vaccine, what vaccines should be given?

If the child comes between 2 to 5 years without any vaccination, two doses of DT can be given with OPV with a minimum gap of 4 weeks (or one month). A single dose of measles vaccine also needs to be given with first dose of DT.



Why should there be a minimum gap of 4 weeks between two doses of DPT?

This is because decreasing the interval between two doses may interfere with the antibody response and protection.

Why give the DPT vaccine in the antero-lateral mid thigh and not the gluteal region (buttocks)?

DPT is given in the antero-lateral mid-thigh and not the gluteal region to prevent damage to the sciatic nerve. Moreover, the vaccine deposited in the fat of gluteal region does not invoke the appropriate immune response.

What should one do if the child is found allergic to DPT or develops encephalopathy after DPT?

A child who is allergic to DPT or develops encephalopathy after DPT should be given the DT vaccine instead of DPT for the remaining doses, as it is usually the P (whole cell Pertussis) component of the vaccine which causes the allergy/encephalopathy.

TT VACCINE

If a girl received all doses of DPT, DT and TT as per the NIS till 16 years of age and she gets pregnant at 18 years, should she get one dose of TT during pregnancy?

Give 2 doses of TT during the pregnancy as per the schedule.

HEPATITIS B VACCINE

Can Hepatitis B vaccine be mixed in the same syringe with DPT and given as one injection?

No, DPT and Hepatitis B vaccine (if supplied separately) cannot be mixed or administered through the same syringe.

Until what age can Hepatitis B vaccine be given?

According to the National Immunization Schedule, Hepatitis B vaccine should be given with the first, second and third doses of DPT till one year of age.

Why give the birth dose of Hepatitis B vaccine only within 24 hours of birth?

The birth dose of Hepatitis B vaccine (within the first 24 hours) is effective in preventing peri-natal transmission of Hepatitis B.

MEASLES VACCINE

Why give the Measles vaccine only on the right upper arm?

The Measles vaccine is given on the right upper arm to maintain uniformity and to help surveyors in verifying the receipt of the vaccine.

If a child has received the Measles vaccine before 9 months of age, is it necessary to repeat the vaccine later?

Yes, the Measles vaccine needs to be administered, according to the National Immunization Schedule, after the completion of 9 months until 12 months of age. If not administered in the ideal age for Measles vaccine, it can be administered until 5 years of age.

JE (SA 14-14-2) VACCINE

If a child 16-24 months of age has been immunized with JE vaccine during an SIA, can it receive the JE vaccine again, as part of RI?

No, currently this is a single dose vaccine and should not be repeated.

If a child above 2 years (24 months) of age has not received the JE vaccine through either RI or an SIA, should s/he be given the JE vaccine?

Yes, the child is eligible to receive a dose of the JE vaccine, through RI, till the age of 15 years.

VITAMIN A

How many prophylactic doses of vitamin A should be given and till what age?

A total of 9 prophylactic doses of vitamin A should be given till 5 years of age.

What should be the minimum gap between two doses of Vitamin A?

The minimum gap between any two doses of vitamin A should be 6 months.

How should Vitamin A syrup be administered?

Vitamin A syrup should be administered using only the spoon/dispenser provided with each bottle. The half mark in the spoon indicates 100,000 IU and a level full spoon contains 200,000 IU of Vitamin A.

What is the treatment schedule for children with clinical signs of vitamin A deficiency?

Administer 200,000 IU of Vitamin A immediately after diagnosis, followed by another dose of 200,000 IU, 1-4 weeks later.

What are the storage guidelines for un-opened bottles of Vitamin A solution?

Vitamin A solution must be kept away from direct sunlight and can be used until the expiry date.

How long can a bottle of Vitamin A be used, once opened?

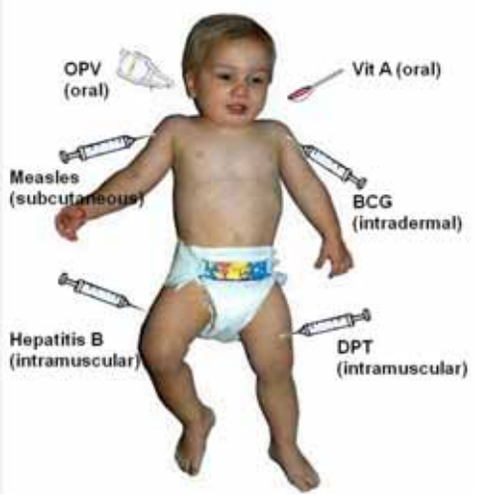
A Vitamin A bottle, once opened, should be used within 6-8 weeks. Write the date of opening on the bottle.

Other than Vitamin A supplementation, what are other policy guidelines to prevent vitamin A deficiency?

These are promotion of:

- early and exclusive breast feeding, including feeding of colostrum, rich in vitamin A.
- regular consumption of dark green leafy vegetables or yellow and orange fruits and vegetables like pumpkin, carrots, papaya, mango, oranges along with cereals and pulses to a weaning child
- consumption of milk, cheese, curd, ghee, eggs, liver etc.

ALL VACCINES



If a child who has never been vaccinated is brought at 9 months of age, can all the due vaccines be given to a child on the same day?

Yes, all the due vaccines can be given during the same session but at different injection sites using separate AD syringes. It is safe and effective to give BCG, DPT, Hepatitis B, OPV and Measles vaccines and Vitamin A at the same time to a 9 months old child who has never been vaccinated.

If the mother/caregiver permits administration of only one injection during an infant's first visit at 9 months of age, which vaccine should be given?

At 9 months of age, the priority is to give measles vaccine with OPV and Vitamin-A.

Which vaccines can be given to a child between 1-2 years of age, who has never been vaccinated?

The child should be given DPT1, OPV-1, Measles and 2ml of Vitamin A solution. It should then be given the second and third doses of DPT and OPV at one month intervals till 2

years of age. The Booster doses can be given at a minimum of 6 months after administering OPV3/DPT3.

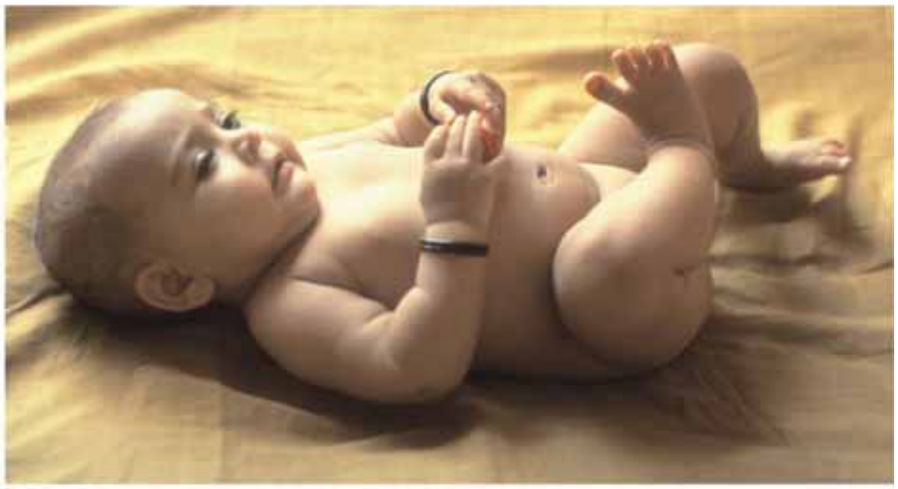
What vaccines should one give to a child who is brought after 6 years of age for the first time?

Give the child only 2 doses of TT one month apart.

Why is it not advisable to clean the injection site with a spirit swab before vaccination?

This is because some of the live components of the vaccine are killed if they come in contact with spirit.

Emphasize the need for completing immunization at the correct age. Even If a child comes beyond the due date for a vaccine, the child should receive all the due vaccines.



UNIT 3

Planning Immunization Services

LEARNING OBJECTIVES

1. To develop an appropriate micro-plan for the sub-center and PHC/UHC levels

Planning for routine immunization is a continuous process of analyzing data, evaluating progress and constraints and making decisions about reaching program objectives. The building block of planning for routine immunization is the sub-center microplan, which is compiled at the PHC and further at the district level. *Table 3.1* summarizes the components of a microplan and the levels at which it is prepared.

With the help of IO/ICC and other supervisors, assist Health Workers, with AWW, ASHA, Social mobilizers, Gram Panchayat members and NGOs/CBOs, in preparing the annual SC microplan. Microplanning is a dynamic process. Regularly review and update your microplans.

Table 3.1: Components of the Immunization Microplan

Sub-center	
	▪ **An estimation of beneficiaries**
	▪ **An estimation of vaccines, and logistics**
	▪ **A work plan, including:**
	  ▪ **Who will provide the services?**
	  ▪ **Who will assist in provision of the services (AWW, ASHA, Social mobilizers, Gram Panchayat members, NGOs etc)**
	  ▪ **Where will the services be provided (selection of sites)?**
	  ▪ **When will the services be provided (planning of sessions)?**

SC/PHC	 ▪ **An Area Map (with villages, hamlets, hard to reach areas, etc. at the SC-level. For the block level, the map includes SC boundaries, with alternate vaccine delivery routes and vaccine storage points.**
PHC/District	▪ **A plan for Supervision** ▪ **A budget that includes the costs of transport, meetings, social mobilization and other activities.** ▪ **IEC and Training Plans** 

Steps in preparing a Microplan

To prepare the Microplan for the immunization of pregnant women and children till 5 years of age, (*See Table 3.2*) follow the steps outlined below.

Step	What to write	Formula/Explanation
1	In the column village: All the villages and hamlets in the sub-center area.	If some hamlets have too small a population to warrant an exclusive session in their area, tag these along with larger neighbouring villages.
2	In the column total population: Each village and hamlet's population based on the actual headcount.	Conduct the head count through the Community Needs Assessment Approach or the biannual/annual survey method.
Estimation of Beneficiaries		
3	In the column a: The annual target of pregnant women by multiplying the actual headcount of pregnant women by 2.	The headcount would provide a point estimate for only 6 months (as pregnancies in the first trimester may be undetected). Hence, multiply the headcount by 2 to arrive at an estimate for 12 months.
4	In the column b: The annual target of infants	Based on actual headcount
5	In the column c: The monthly target of pregnant women.	=annual target of pregnant women (column a) ÷ 12
6	In the column d: The monthly target of infants	=annual target of infants (column b) ÷ 12
7	In the columns e to l: The beneficiaries per month for each vaccine[1] and Vitamin A.	TT =Monthly target of pregnant women (column c) x 2 doses BCG =Monthly target of infants (column d) x 1 dose DPT =Monthly target of infants (column d) x 4 doses[2] OPV =Monthly target of infants (column d) x 4 doses[3] HepB =Monthly target of infants (column d) x 3 doses Measles =Monthly target of infants (column d) x 1 dose DT =Monthly target of infants (column d) x 1 dose VitA =Monthly target of infants (column d) x 9 doses
Estimation of vaccines and logistics		
8	In the columns m to t: The requirement of vaccine vials and	A wastage rate of 25% or a wastage multiplication factor (WMF) of 1.33[4] is allowed for all vaccines

[1] Based on the specific needs of the PHC, add the calculations of beneficiaries for the following doses:
OPV-0 = *Monthly target of infants* (column d) x 1 dose
HepB-Birth = *Monthly target of infants* (column d) x 1 dose.
If the combo DPT-Hep B vaccine is available, then calculate for only 3 doses of DPT-HepB combo.
TT-10 = expected 10 yr old population x 1 dose
TT-16 = expected 16 yr old population x 1 dose
JE = *Monthly target of infants* (column d) x 1 dose
[2] including 1 booster dose
[3] including 1 booster dose

<table>
<tr><th>Step</th><th>What to write</th><th>Formula/Explanation</th></tr>
<tr><td></td><td>Vitamin A per month.</td><td>supplied in the UIP. Multiply the beneficiaries per month for the particular vaccine (columns "e" to "k") by the WMF of 1.33 and then divide the product by the number of doses per vial.
<table>
<tr><td>TT/BCG/DPT/HepB/DT</td><td>= columns e/f/g/i/k X 1.33
10</td></tr>
<tr><td>OPV</td><td>= column h X 1.33
20</td></tr>
<tr><td>Measles</td><td>= column j X 1.33
5</td></tr>
</table>
However, ensure that a minimum of one vial of each vaccine is available for every session. Also ensure that the ampoules of diluents are equal to the required number of BCG and Measles vials. A wastage rate of 10% (or a WMF of 1.11)[5] is allowed for VitA. Multiply the beneficiaries per month for vitamin A (column "l") by the WMF factor of 1.11. However, remember to calculate the first 1 ml dose of Vitamin A (for 9-12 months) and the subsequent 8 doses of 2ml each.
<table>
<tr><td>Vitamin A</td><td>= {(column d x 1 ml) + (column d x 2 ml x 8)} x 1.11</td></tr>
</table></td></tr>
<tr><td>9</td><td>In the columns u, v and w: The requirement of syringes per month.</td><td>A wastage rate of 10% (or a WMF of 1.11) is allowed for all ADS and reconstitution syringes. Multiply the beneficiaries per month for each vaccine (columns "e" to "k") by the WMF of 1.11. Individually for each logistic, the formula is thus:
<table>
<tr><td>0.1 ml ADS</td><td>= Beneficiaries for BCG (column f) x 1.1</td></tr>
<tr><td>0.5 ml ADS</td><td>= Beneficiaries for TT, DPT, HepB, Measles and DT (columns e + g + i + j + k) x 1.1</td></tr>
<tr><td>Reconstitution Syringes</td><td>= BCG and Measles vials (columns n + r) X 1.1</td></tr>
</table></td></tr>
</table>

[4] The **Wastage rate** (%) is the proportion of vaccine (and other injection items) that are wasted due to a variety of reasons to that which was appropriately used (i.e. number of infants vaccinated). The **Wastage multiplication factor** is a mathematical derivative used to account for the correct amount needed for an immunization session, taking into account the existing wastage rate. E.g. if the vaccine wastage rate is 25 %, the WMF is 100/(100 - 25) = 1.33

[5] If the Wastage rate is 10%, the WMF is 100/(100 - 10) = 1.11

Step	What to write	Formula/Explanation
ANM Work Plan/ Roster		
10	In the column village: The list of villages and hamlets in the SC area with session sites. ***Remember to follow the "Fixed Day, Fixed Site" principle.***	List all the villages and hamlets in the Sub-Center area in the same order as described in Step 1. Consult the AWW, ASHA, TBAs, PRI and the community to select accessible immunization session sites (government buildings[6] such as SCs or AWCs) and convenient days and time.
11	In the column Distance [km]: The distance of the village from the closest ILR point.	The ILR point refers to the last vaccine storage point, where vaccines are distributed to session sites. Usually, these are located in the PHCs, Additional PHCs and CHCs etc.
12	In the columns AWW and ASHA: The names of the AWW and ASHA	
13	In the column Injections per month: The monthly injection load per village	= *columns e + f +g + i + j + k* (i.e. all vaccines, except the non- injectable OPV).
14	In the column Sessions required per month: The number of sessions required per month.	**Outreach sites** (SC, AWC, etc, without vaccine storage facility) with an injection load[7] of: 1-24 injections = 1 session every alternate month 25-50 injections= 1 session per month 51-100 injections = 2 sessions per month, Etc **For hard-to-reach areas** with a population of less than 1000, hold a minimum of 4 sessions in a year. **Fixed sites** (PHC, CHC, district hospital or others, where vaccine is stored) with an injection load of: 1-39 injections = 1 session every alternate month 40-70 injections= 1 session per month 71-140 injections = 2 sessions per month, Etc ***For a busy CHC/RH, plan daily sessions.***
15	In the column month: The day of immunization session in the village.	

[6] In case such buildings do not exist, use alternative sites such as Community Centers, Schools and other places, which are easily accessible to all sections of the community

[7] The **Injection load** is the average injections during a session based on the expected number of beneficiaries. For example, if there are 25 births annually in a population of 1000, there would be approximately 2 infants and 2 pregnant women for immunization every month. The monthly injection load for such a village can be calculated as follows:

- 2 infants for BCG and 2 infants for Measles (4 injections)
- 2 infants each for DPT and OPV 1,2,3 (6 injections)
- 2 infants each for Hepatitis B 1, 2, 3 (6 injections).
- 2 Children each for DPT booster and DT booster (4 injections)
- 2 pregnant women, each for TT1 and TT2 (4 injections)

Therefore, a total of about 24 injections need to be given in a month. This means that one session has to be held every alternate month.

Table 3.2: Sub-center Microplan (ANM: Geeta Rani)

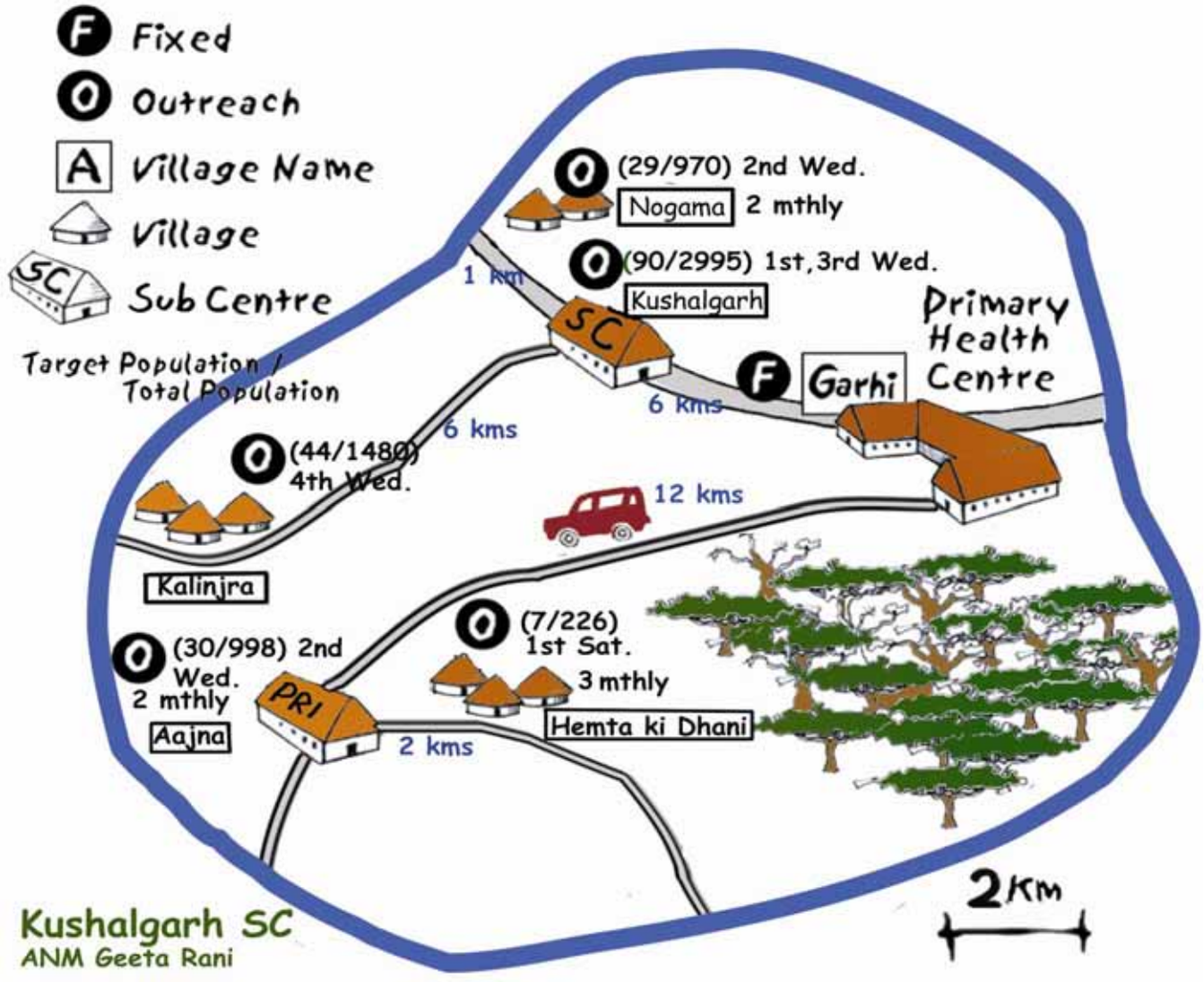
Sl.No.	Village	Total Population	Estimation of Beneficiaries: Annual Target PW	Annual Target Infants	Monthly Target PW	Monthly Target Infants	Beneficiaries per month for each vaccine & Vitamin A: TT	BCG	DPT	OPV	Hepatitis B	Measles	DT	Vitamin A	Estimation of Vaccines and Logistics: Vaccine vials & Vitamin A per month: TT	BCG	DPT	OPV	Hepatitis B	Measles	DT	Vitamin A (in ml)	Syringes per month: ADS 0.1 ml	ADS 0.5 ml	Reconstitution
			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w
Formula		Based on actual headcount	Based on actual headcount	Based on actual headcount	Column a ÷ 12	Column b ÷ 12	Column c x 2	Column d x 1	Column d x 4	Column d x 4	Column d x 3	Column d x 1	Column d x 1	Column d x 9	(Column e x 1.33) ÷ 10	(Column f x 1.33) ÷ 10	(Column g x 1.33) ÷10	(Column h x 1.33) ÷ 20	(Column i x 1.33) ÷ 10	(Column j x 1.33) ÷ 5	(Column k x 1.33) ÷ 10	{(column d x 1 ml) + (column d x 8) x 2 ml)} x 1.11	Column f X 1.1	(Columns e + g + i + j + k) X 1.1	(Columns n + r) X 1.1
1	Kushalgarh (SC)	2995	99	90	8	7	16	7	28	28	21	7	7	63	3	1	4	2	3	2	1	132	8	87	4
2	Nogama	970	32	29	3	2	6	2	8	8	6	2	2	18	1	1	2	1	1	1	1	38	3	27	3
3	Kalinjra	1480	49	44	4	4	8	4	16	16	12	4	4	36	2	1	3	2	2	2	1	75	5	49	4
4	Aajna	998	33	30	3	2	6	2	8	8	6	2	2	18	1	1	2	1	1	1	1	38	3	27	3
5	Hemta Ki Dhani	226	7	7	1	1	2	1	4	4	3	1	1	9	1	1	1	1	1	1	1	19	2	13	3

ANM Work Plan/ Roster

Sl.No.	Village	Distance (kms) from ILR point	AWW	ASHA	Injections per month	Sessions required per month	Month 1: Wed 1	Wed 2	Wed 3	Wed 4	Sat 1	Sat 2	Sat 3	Sat 4	Month 2: Wed 1	Wed 2	Wed 3	Wed 4	Sat 1	Sat 2	Sat 3	Sat 4	Month 3: Wed 1	Wed 2	Wed 3	Wed 4	Sat 1	Sat 2	Sat 3	Sat 4
1	Kushalgarh (SC)	6	Anupma	Mina	86	Twice/ a mth	x		x						x		x						x		x					
2	Nogama (AWC)	7	Rukmani	Babli	26	Once/ 2 mths		x																x						
3	Kalinjra (AWC)	12	Shaeela	Laali	48	Once/a mth				x								x								x				
4	Aajna (PRI)	12	Madhavi	Kanta	26	Once/ 2 mths										x														
5	Hemta Ki Dhani (AWC)	14	Geeta	Kuribai	12	Once/ 3 mths					x																			

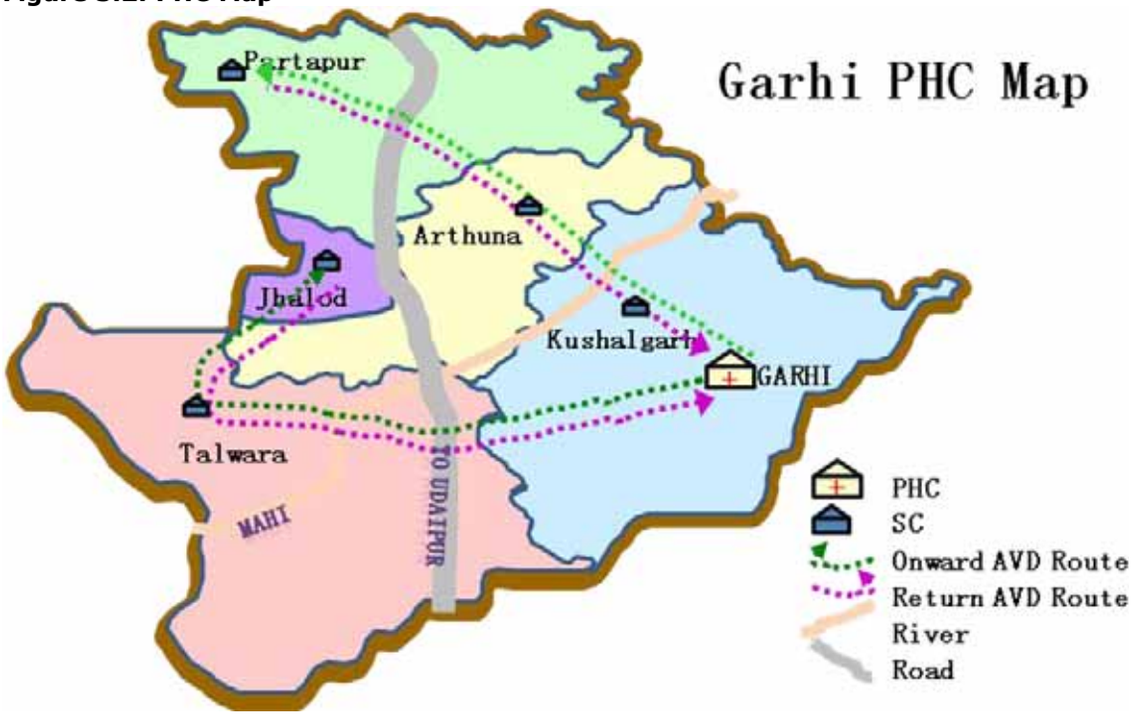
Step	What to write	Formula/Explanation
Area Map		
16	Prepare a map of the Sub-Center area. *See Figure 3.1.*	Include all villages and hamlets with their: ▪ total population and annual target infants ▪ Anganwadi Centers and session sites ▪ Distance from the ILR point and transport mode ▪ Landmarks e.g. Panchayat, school, roads etc. ▪ sessions days

Figure 3.1: Sub-Center Map



	Prepare a map of the PHC area. *See Figure 3.2.* Also prepare a route chart for Alternate Vaccine Delivery. *See Appendix 3.1.*	Base the PHC map on the Sub-Center maps. Additionally, include the route chart for alternate vaccine (and logistics) delivery (AVD) to the session sites from cold chain storage points. AVD helps ensure that sessions are held according to plan and on time. You can exercise flexibility in planning for AVD in terms of methods of delivery and routes, based on the distance of the session sites.

Figure 3.2: PHC Map



Plan for Supervision		
17	Prepare a plan for supervision. *See Table 3.3.*	Prepare the supervision plan for a quarter at the PHC level.

Table 3.3: Plan for Supervision

Health Facility: PHC Garhi **Month:** May

Sub-Center	Supervisor	Post	Session Site	Planned visit	Conducted (Y/N)	Remarks
Kushalgarh	Kashinath Soni	HA(M)	Piplod	11 May	Yes	
Talwara	Dr B Singh	MO	Sailana	18 May	Yes	
Arthuna	Rita Matthew	LHV	Arthuna	25 May	No	SIA, visit next wed.
Jhalod	Dr Geeta Joshi	MOIC	Jhalod	31 May	No	SIA, visit next wed.

Budget		
18	Prepare a budget	Although there are certain funding norms, there is also flexibility, based on local requirements, in the NRHM PIP Part C funding for the following immunization-related activities: ▪ Strengthening of monitoring and supervision ▪ Alternate vaccine delivery ▪ Mobilization of children by ASHA/Link workers ▪ Alternate Vaccinators for Slums and under served areas, including vacant SCs. ▪ Computer Assistants to the States ▪ Cold chain maintenance ▪ Review meetings ▪ Printing of RI cards and monitoring tools ▪ Construction of waste pits ▪ Purchase of polythene bags ▪ Training of ANMs and other health workers ▪ Training of refrigerator mechanics ▪ Cold chain handlers training ▪ Training of DIOs and MOs

In **Microplanning for urban areas**, consider these additional points:

Issues	Possible Solutions
Multiplicity of public health services with unclear demarcation of catchment areas	Map all administrative zones and wards, with clear demarcation of catchment areas of various public health service providers (Municipal or Health Department). Include all NGOs, Private and Charitable hospitals, AWCs etc.
Large slums, with populations un-served or under-served by public health services or ICDS Presence of multiple private sector health providers, including NGOs and CBOs	Include all slums (recognized and unrecognized) and other under-served areas. If there is a paucity of ANMs, hire alternate vaccinators, including private doctors, NGOs. Also involve local CBOs in social mobilization. If there are insufficient AWCs, plan sessions in schools, CBOs, youth clubs etc.
Overcrowding in slums	Plan sessions more frequently, if required

APPENDIX 3.1: ALTERNATE VACCINE DELIVERY PLAN

District : Banswara	**Block :** Garhi	**Health Facility** : Garhi PHC
ILR Point: Garhi PHC	**Day:** Wed 1☑ 2☐ 3☐ 4☐/ Sat 1☐ 2☐ 3☐ 4☐	**Total Sessions on the day :**13

List Session Sites on the same route for the day in increasing distance from ILR Point.

Route No	SN	Session Site	Name of ANM	Distance from ILR Point	App.Time from ILR Point	Time of Departure from ILR Point	Time of Delivery Vaccine Carriers	Time when Vaccine Carrier will be collected back	Mode of Transport (Vehicle Number)	Name of Courier/ Driver
Route 1: Garhi-Peepalkhunt-Pratapgarh Road	1	Chhari AWC	Sushma Pargi	3 km	6 mins	8.00 AM	8.06 AM	3.51 PM	Hired Jeep (RA01-2869)	Krishnalal Patidar
	2	Bhagora SC	Rameela Chauhan	7 km	15 mins		8.20 AM	3.37 PM		
	3	Dunglawani AWC	Jamna Kumari	10 km	20 mins		8.30 AM	3.27 PM		
	4	Rohaniya h/o Sarpanch	Sharada Singh	12 km	25 mins		8.40 AM	3.17 PM		
	5	Sarwan AWC	Bhubneshwari	15 km	30 mins		8.50 AM	3.07 PM		
	6	Sodalpur Pry School	Gulab Devi Meena	16 km	32 mins		8.57 AM	3.00 PM		
Route 2: Garhi Kushalgarh Road	1	Kushalgarh SC	Geeta Rani	6 km	12 mins	8.00 AM	8.12 AM	3.36 PM	PHC Van (RAR-2686)	Nathu Ram
	2	Sabalpura AWC	Gajendra Kumari	8 km	16 mins		8.21 AM	3.25 PM		
	3	Ramgarh AWC	Bhuri Devi	11 km	22 mins		8.32 AM	3.12 PM		
	4	Chhoti Sarwa Pri School	Sheela Rooplal	14 km	30 mins		8.45 AM	3.02 PM		
	5	Bijori Kalan AWC	Shashi Kiran	17 km	35 mins		8.55 AM	3.00 PM		
Garhi town	1	Garhi Rural Hospital	Mita Sharma	1 km	10 mins	8.45 AM			ANM Collects	
	2	Yusufpura AWC	Sona Lohar	2 Km	15 mins					

Signature of Block Medical Officer: **Signature of IO/ICC:**

UNIT 4

Cold Chain and Logistics Management

LEARNING OBJECTIVES

1. To list essential elements of the cold chain system and its importance in the immunization Program.
2. To list factors affecting potency of vaccines and precautionary measures to ensure the potency of vaccines.
3. To describe the cold chain equipment at various levels in the district
4. To correctly store and stock vaccines, ice packs and diluents in the refrigerator/ILR/freezers at district and block health facilities and during the transport.
5. To institute preventive maintenance measures for Cold Chain Equipment and contingency plans in case of breakdown of equipment
6. To follow the steps for managing logistics of vaccines and other supplies.

The Cold Chain is a system of storing and transporting vaccines at recommended temperatures from the point of manufacture to the point of use. The key elements of the cold chain are:

- Personnel: to manage vaccine storage and distribution
- Equipment: to store and transport vaccine and to monitor temperature
- Procedures: to ensure that vaccines are stored and transported at appropriate temperatures

Keeping vaccines at the right temperature is not an easy task, but the consequences of not doing so can be disastrous. Once vaccine potency is lost, it cannot be regained. The damaged vaccines must be destroyed, leading to inadequate vaccine stocks and wastage of expensive vaccines. Moreover, children and women who receive a vaccine that is not potent are not protected. For a summary of vaccine sensitivities, *see Table 4.1*

The Cold Chain is a system of storing and transporting vaccines at recommended temperatures from the point of manufacture to the point of use.

Table 4.1: Summary of Vaccine Sensitivities

Vaccine	Exposure to heat/light	Exposure to cold	Temperature at PHC
Heat and light sensitive vaccines			
BCG	Relatively heat stable, but sensitive to light	Not damaged by freezing.	**+2°C to +8°C**
OPV	Sensitive to heat	Not damaged by freezing	**+2°C to +8°C**
Measles	Sensitive to heat and light	Not damaged by freezing	**+2°C to +8°C**
Freeze Sensitive Vaccines			
DPT	Relatively heat stable	Freezes at -3°C (Should not be frozen)	**+2°C to +8°C**
Hepatitis B	Relatively heat stable	Freezes at -0.5°C (Should not be frozen)	**+2°C to +8°C**
DT	Relatively heat stable	Freezes at -3°C (Should not be frozen)	**+2°C to +8°C**
TT	Relatively heat stable	Freezes at -3°C (Should not be frozen)	**+2°C to +8°C**
At the PHC level, all vaccines are kept in the ILR for a period of one month at temperature of +2^{0}C to +8^{0}C			

Thermo-sensitivity of Vaccines

Vaccines sensitive to heat

- **BCG** (after reconstitution)
- **OPV**
- **Measles**
- **DPT**
- **BCG** (before reconstitution)
- **DT,TT, Hep.B, JE**

Most → Least

Vaccines sensitive to freezing

- **Hep- B**
- **DPT**
- **DT**
- **TT**

Most → Least

Vaccine Damage

The physical appearance of the vaccine may remain unchanged even after it is damaged. However, the loss of

potency due to either exposure to heat or cold is permanent and can not be regained.

HEAT DAMAGE

The physical appearance of the vaccine may remain unchanged even after it is damaged. However, the loss of potency due to either exposure to heat or cold is permanent and cannot be regained.

All vaccines are damaged by temperatures more than $+8^0$C, whether they are exposed to a lot of heat in a short time (e.g., as a result of keeping vaccine in a closed vehicle in the sun) or a small amount of heat over a long period (e.g., as a result of the frequent opening of lid of ILR).

Reconstituted BCG, measles and JE vaccines are the most sensitive to heat and light. Since these live vaccines do not contain preservatives, there is risk of contamination with staphylococcus aureus leading to Toxic Shock Syndrome and, therefore, they should not be used after 4 hours of reconstitution.

Checking for heat damage: The Vaccine Vial Monitor (VVM): A VVM is a label containing a heat-sensitive material which is placed on a vaccine vial to register cumulative heat exposure over time.

The combined effects of time and temperature cause the inner square of the VVM to darken gradually and irreversibly**.** Before opening a vial, check the status of the VVM.

Does a VVM measure vaccine potency? No, the VVM does not directly measure vaccine potency but it gives information about the main factor that affects potency: heat exposure over a period of time. The VVM does not, however,

measure exposure to freezing that contributes to the degradation of freeze-sensitive vaccines.

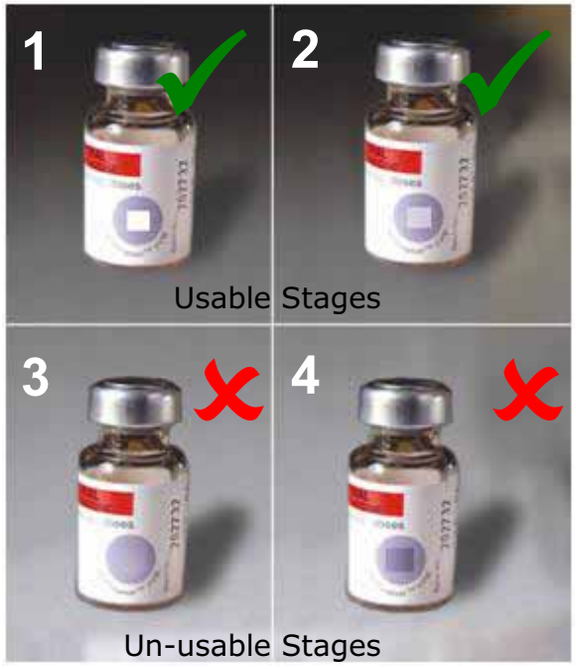


Figure 4.1: Different stages of the VVM

Reading the Stages of the VVM

1. The inner square is lighter than the outer circle. *If the expiry date has not been passed* ***: USE*** *the vaccine*
2. The inner square is still lighter than the outer circle. *If the expiry date has not been passed****: USE*** *the vaccine*

Discard Point:

3. The colour of the inner square matches that of the outer circle: ***DO NOT*** *use the vaccine*

Beyond the Discard Point:

4. The colour of the inner square is darker than the outer circle: ***DO NOT*** *use the vaccine*

Correct Storage and Use of Diluents

Only use the diluents supplied and packaged by the manufacturer with the vaccine, since the diluent is specifically designed for the needs of that vaccine, with respect to volume, PH level and chemical properties.

Store the diluents, between +2° to +8°C in the ILR. If there are constraints of space, then store diluents outside the cold chain. However, remember to cool diluents for at least 24 hours before use to ensure that vaccines and diluents are at +2° to +8°C when being reconstituted. Otherwise, it can lead to thermal shock i.e. the death of some or all the essential live organisms in the vaccine. Store the diluents and droppers with the vaccines in the vaccine carrier during transportation. Diluents should not come in direct contact with the ice pack.

FREEZE DAMAGE

Hepatitis B, DPT, DT, and TT vaccines lose their potency if frozen. Freezing dissociates the antigen from the adjuvant alum thus interfering with the immunogenicity of the vaccine. Moreover, the risk of adverse events following immunization, such as sterile abscesses, may increase.

Therefore, always store 'T-series' vaccines (DPT, DT, TT) and Hep.B vaccine between +2° and +8°C.

Diluents must be cooled for at least 24 hours before use to ensure that vaccines and diluents are at +2°C and +8°C when being reconstituted.

If the vials are found to be frozen or contain floccules, discard the vials. Conduct the shake test (*See Appendix 4.1.*) if you suspect that vials could have been frozen.

LIGHT DAMAGE

BCG and Measles vaccines are also light-sensitive, which is why they are supplied in amber-colored vials. Therefore, they need to be kept away from light.

Protect all vaccines from direct sunlight.

Do not keep in the cold chain, any vials that are expired, frozen or with VVMs beyond the discard point, as they may be confused with those containing potent vaccines. Keep them in the red bag for disinfection and disposal.

Cold Chain Equipment

Cold chain equipment, both electrical and non-electrical, is used for storing vaccines and/or transporting them at appropriate temperatures. *Table 4.2* summarizes the cold chain equipment supplied under the UIP.

Table 4.2: Summary of Cold Chain Equipment			
Equipment	**Temperature**	**Storage Capacity**	**Holdover time[8]**
Electrical			
Deep Freezer (Large)	-15^{0}C - -25 ^{0}C	200 ice packs or OPV stock for 3 months (120,000 – 180,000 doses)	43^{0}C for 18 Hrs 32^{0}C for 22 Hrs
ILR (Large)	+2^{0}C - +8^{0}C	BCG, DPT, DT, TT, Measles, Hep-B Vaccine stock for 3 months (60,000 doses)	At 43^{0}C for 62 Hrs At 32^{0}C for 78 Hrs
Deep Freezer (Small)	-15^{0}C - -25^{0}C	100 ice packs	At 43^{0}C for 18 Hrs At 32^{0}C for 22 Hrs
ILR (Small)	+2^{0}C - +8^{0}C	BCG, OPV, DT, DPT, TT, Measles, Hep-B vaccine stocks for one month (25,000 doses)	At 43^{0}C for 62 Hrs At 32^{0}C for 78 Hrs
Non-electrical			
Cold Box (Large)	+2^{0}C - +8^{0}C	All vaccines stored for transport or in case of power failure (6000 doses of mixed antigen with 50 ice-packs/ 72-96 icepacks)	At 43^{0}C for 6.5 days At 32^{0}C for 10 days
Cold Box (Small)	+2^{0}C - +8^{0}C	All vaccines stored for transport or in case of power failure. (1500 doses of mixed antigen with 24 ice-packs/36 icepacks)	At 43^{0}C for 6.5 days At 32^{0}C for 10 days
Vaccine carrier (1.7 litres)	+2^{0}C - +8^{0}C	All vaccines carried for 12 hours(4 Ice packs & 16-20 vials)	At 43^{0}C for 34 Hrs At 32^{0}C for 51 Hrs

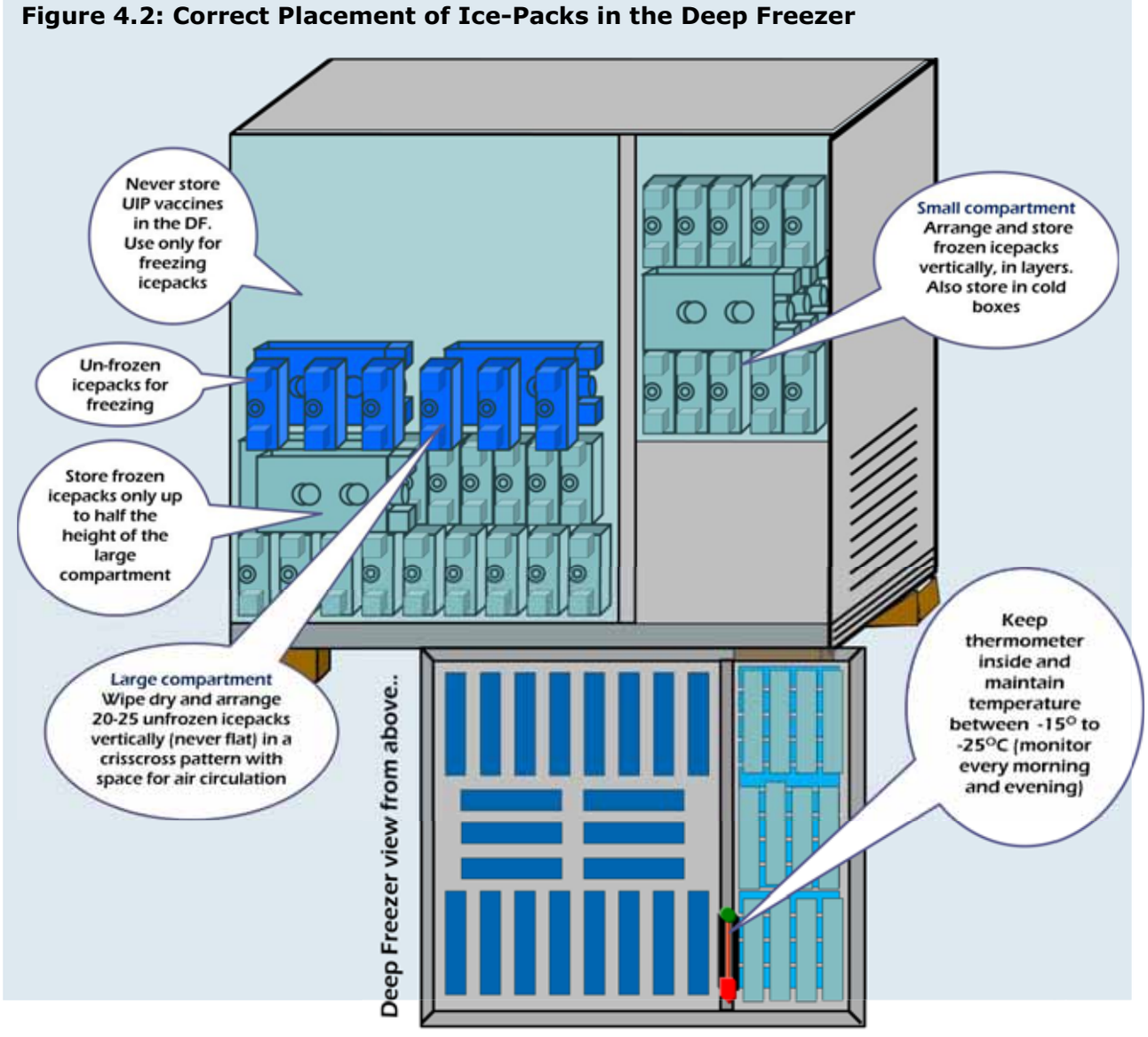
Keep all Electrical Cold Chain equipment

- at least 10 cm away from walls
- protected from rain or flooding and away from direct sunlight
- level and on wooden blocks
- permanently fixed to power socket, labeled "DO NOT UNPLUG"
- properly connected to one Voltage stabilizer per equipment
- locked and keys accessible to designated personnel

[8] **Holdover time** is the time taken for increasing the temperature of vaccines at the time of power failure from its minimum range to its maximum range, subject to the condition that the equipment is functioning well. For example, if the inside temperature of an ILR is 2°C at the time of power failure, the time taken up to reach 8°C will be the holdover time of that ILR. Holdover time depends on the frequency of opening the lid, the quantity of vaccines kept inside with adequate space between the boxes, exposure to direct sunlight and, only in the case of non-electrical cold chain equipment, the condition of icepacks placed inside. Holdover Time varies from one manufacturer to the other.

DEEP FREEZERS *(DFs):* maintain a cabinet temperature between -15°C to -25°C; and store OPV and prepare ice packs at the district level. ***At the PHC level, Deep freezers are used only for preparation of ice packs and are not to be used for storing UIP vaccines.*** About 20-25 icepacks can be prepared by a 140 Liter DF in 24 hours with at least 8 hours of continuous electricity supply. *See Figure 4.2* for correct placement of ice-packs in the DF.

Figure 4.2: Correct Placement of Ice-Packs in the Deep Freezer



ICE LINED REFRIGERATORS *(ILRs):* maintain a cabinet temperature between +2°C to +8°C; and are used to store all UIP vaccines at the PHC level. ILRs are lined with tubes or ice packs filled with water which freezes and keeps the internal temperature at a safe level despite electricity failure. ILRs can keep vaccine safe with as little as 8 hours continuous electricity supply in a 24-hour period. Since ILRs are top-opening, they can hold the cold air inside better than a front-opening refrigerator. *Figure 4.3* indicates correct placement of vaccines in the baskets of an ILR. If baskets are not available, store vaccines (other than OPV and Measles) over two rows of empty ice-packs kept on the platform of the ILR. Measles and OPV can be kept over two rows of empty ice-packs on the floor of the ILR.

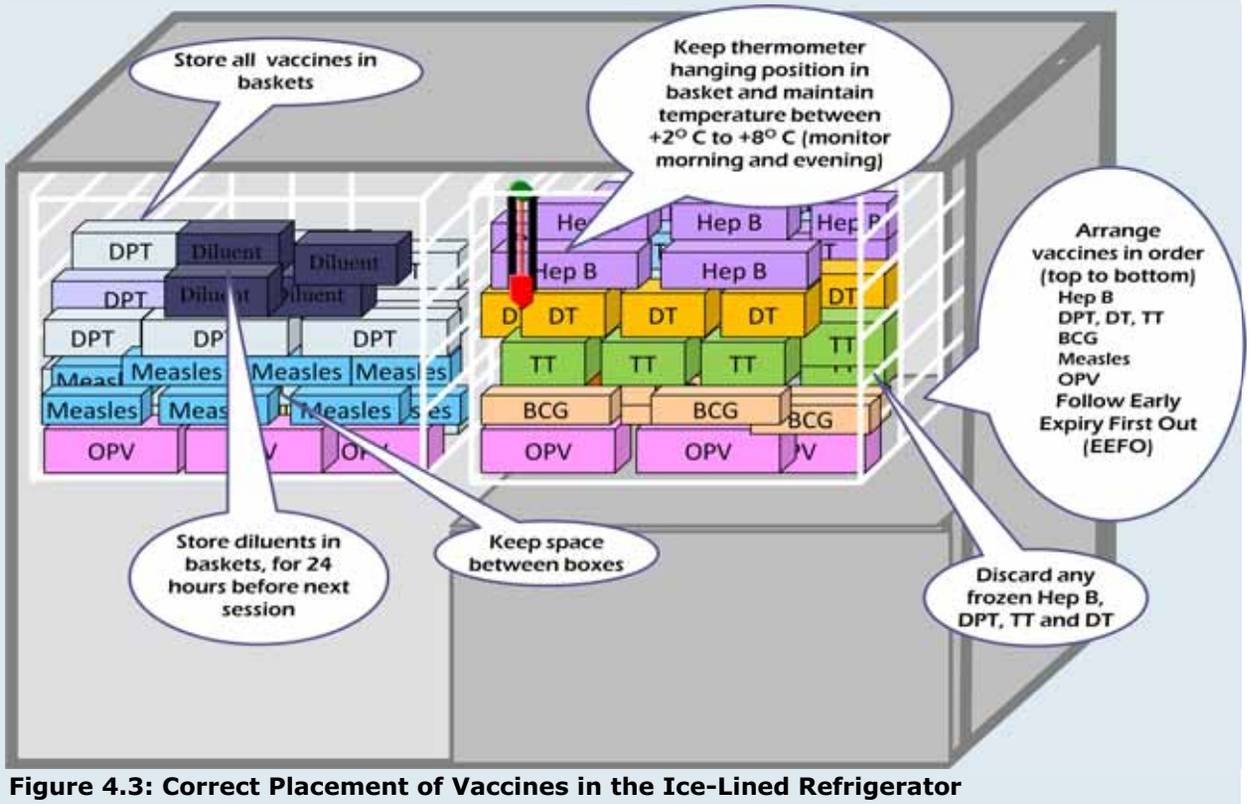
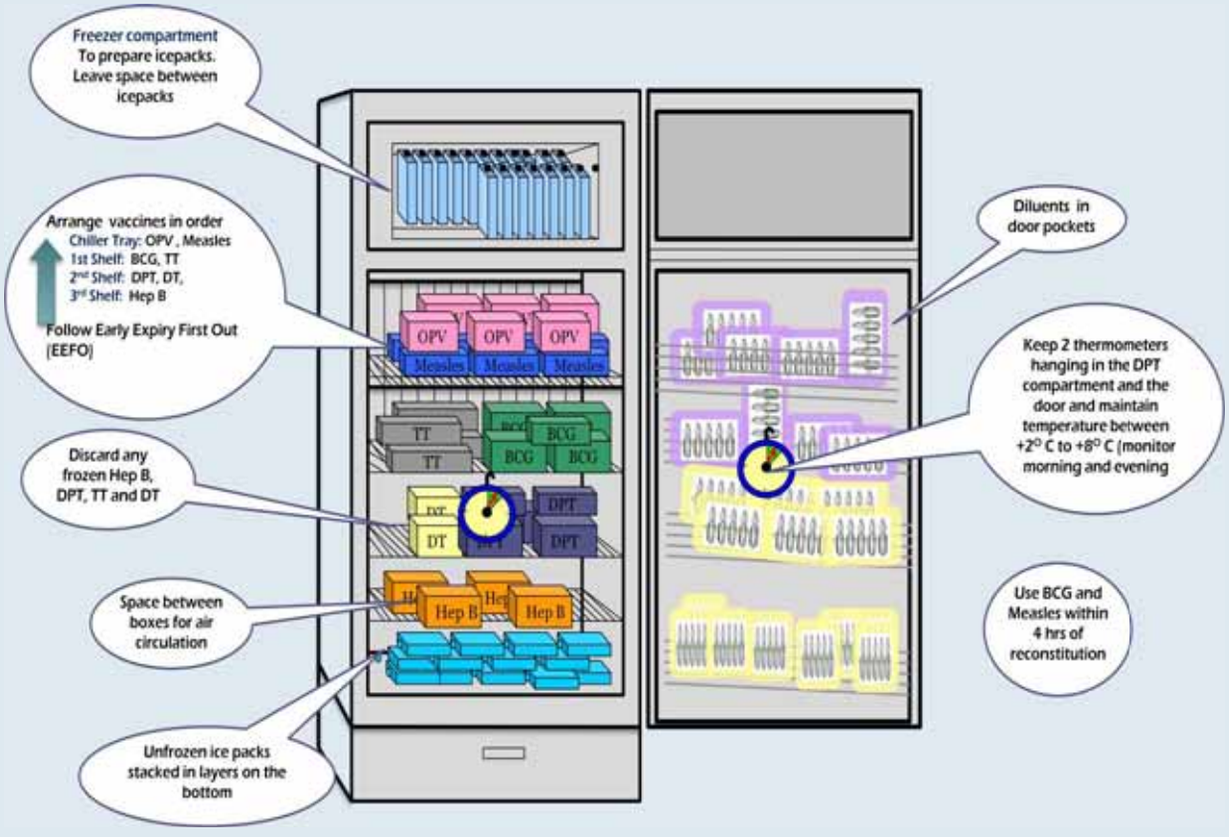


Figure 4.3: Correct Placement of Vaccines in the Ice-Lined Refrigerator

DOMESTIC REFRIGERATORS*:* also maintain a cabinet temperature between +2° to +8°C with a holdover time of only 4 hours. Therefore, they are ***not recommended for common use in the UIP.*** However, they are used in urban dispensaries and by private practitioners in urban areas due to more assured power supply and non-availability of ILRs and DFs. Arrange vaccines and ice-packs in the domestic refrigerator as shown in *Figure 4.4.*

Figure 4.4: Correct Placement of Vaccines and Ice-packs in the Domestic Refrigerator



VACCINE VANS*:* are insulated vans used for transporting the vaccines in bulk. The vaccines should be transported to the last cold storage point only through vaccine vans. Approximately 6 lakh to 10 lakh mixed antigen can be transported at a time. Vaccines should be transported only in Cold boxes with the desired number of conditioned ice packs.

COLD BOXES*:* are insulated boxes, used for transportation and emergency storage of vaccines and icepacks.

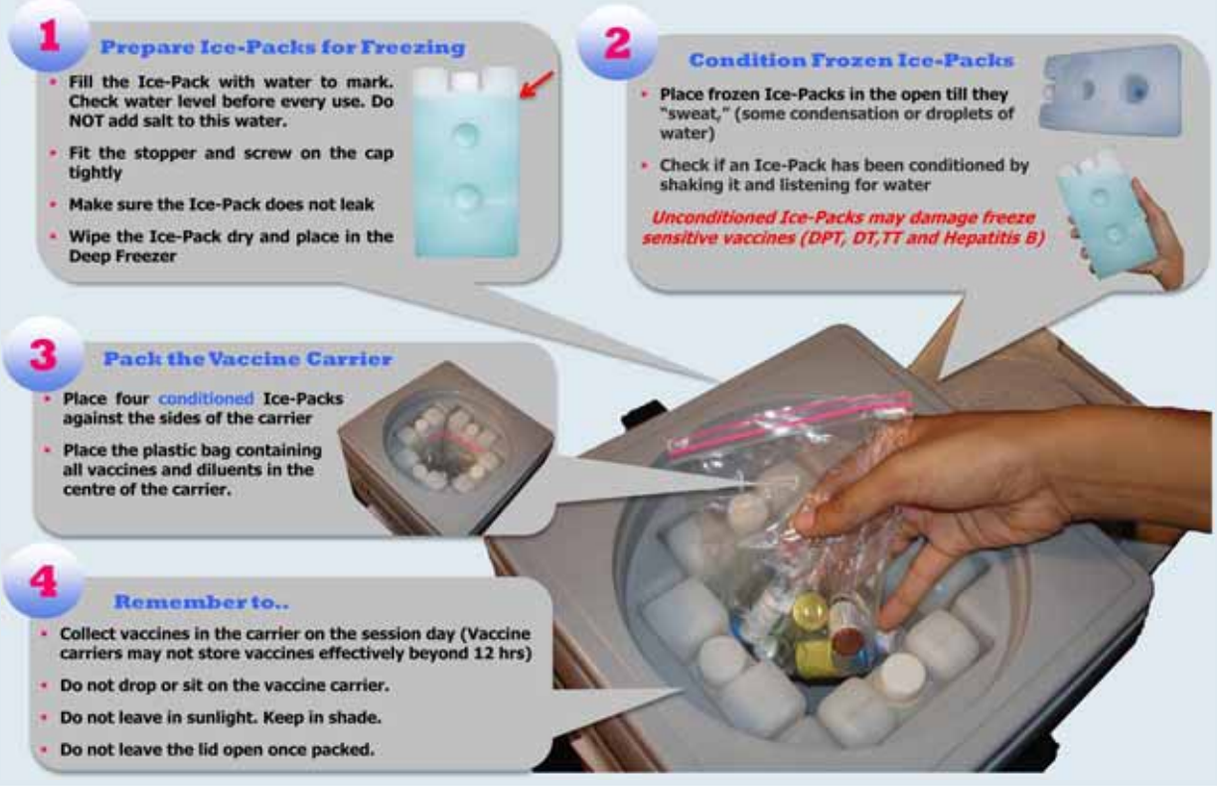
- Place conditioned ice packs at the bottom and sides of the cold box before loading the vaccines in cartons or polythene bags.
- Always keep a thermometer inside the cold box.
- Do not place DPT, DT, Hep B and TT vials in direct contact with conditioned ice packs.
- Do not place weights or other cold boxes on the lid since it will damage the rubber seal

VACCINE CARRIERS: (with 4 conditioned ice packs) maintain the inside temperature between $+2^0$C to $+8^0$C for 12 hours, if not opened frequently. They are used for carrying vaccines (16-20 vials) and diluents from PHCs to session sites. ***Ensure the return of unused vaccine vials from session sites to the PHC on the same day in the cold chain through alternate vaccine delivery. Keep a box labeled "RETURNED UNUSED" in the ILR for all unused vaccines that can be used in subsequent sessions. Discard vaccines that have been returned unopened more than thrice. Do not keep any used vials in the cold chain.***

Never keep any used vials in the cold chain.

- Never use day carriers which contain 2 ice packs or thermos flasks for routine immunization.
- Never use any screw driver or any other sharp shaft to open the lid of vaccine carrier.

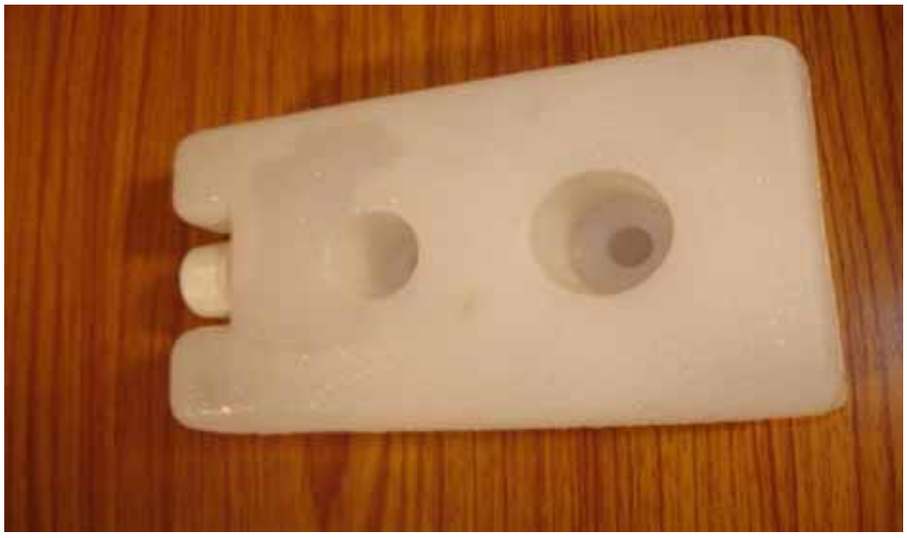
Figure 4.5: Correct Packing of the Vaccine Carriers



ICE-PACKS*:* are plastic containers filled with water. These are frozen in the deep freezer and when placed in non-electrical cold chain equipment such as vaccine carriers and cold boxes, help increase the holdover time.

Condition Icepacks

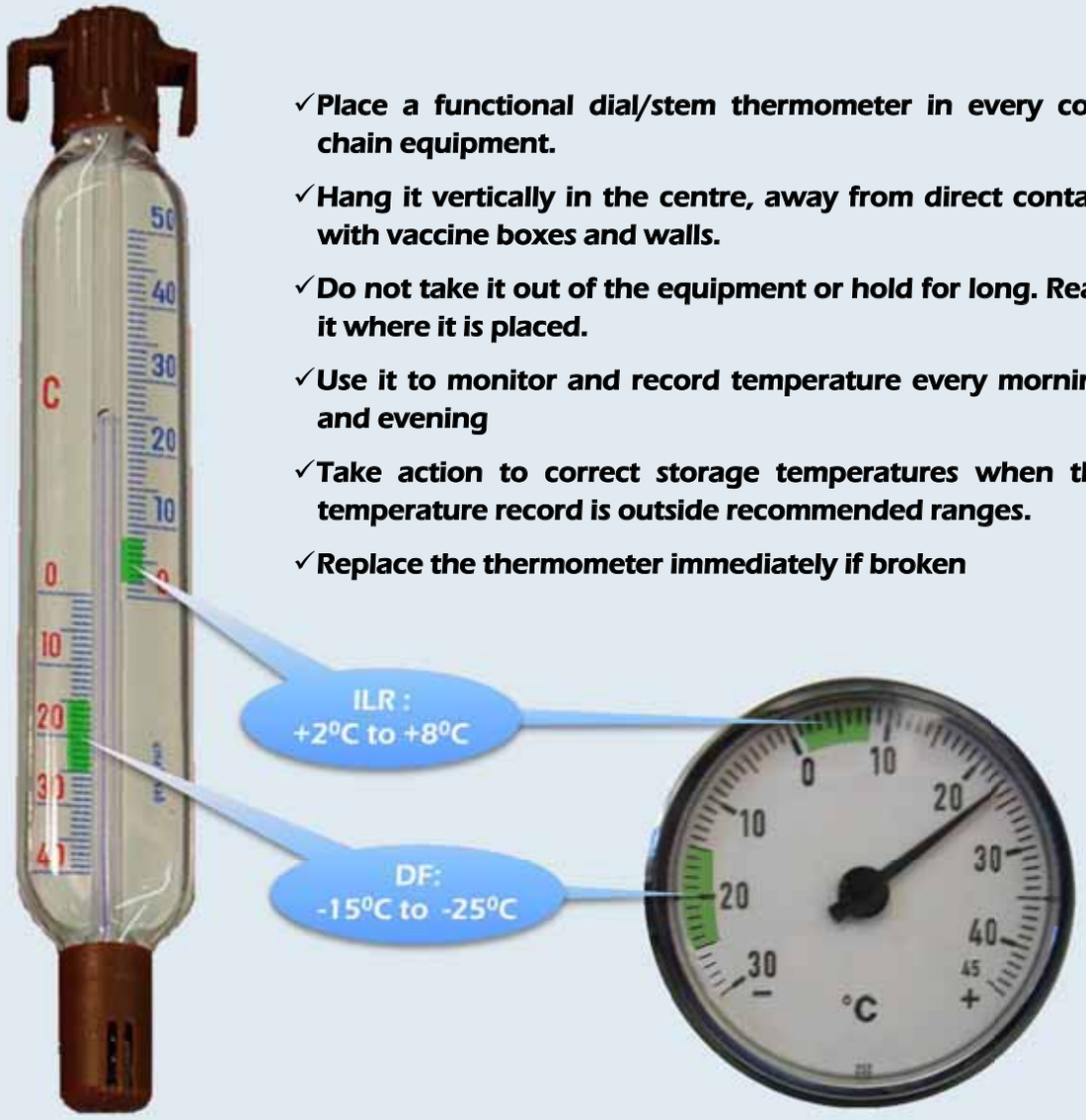
The most common cause of exposure to freezing temperatures is the failure to correctly condition ice packs prior to transport. Conditioning prevents freezing of freeze- sensitive vaccines. When icepacks are removed from a freezer, at say -25°C, they need to be kept at room temperature for long enough to allow the temperature of the ice at the core of the icepack to rise to 0°C. This process is called "conditioning". An icepack is adequately "conditioned" as soon as beads of water cover its surface and the sound of water is heard on shaking it.



An icepack is adequately "conditioned" as soon as beads of water cover its surface and the sound of water is heard on shaking it.

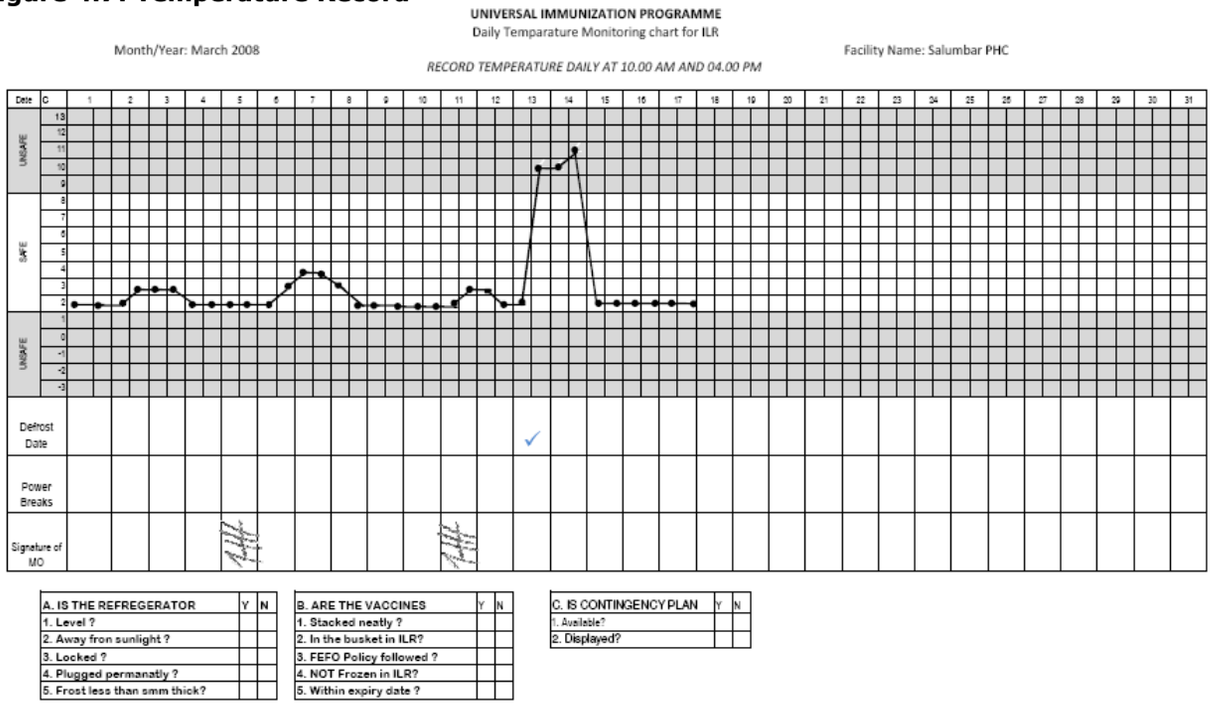
THERMOMETERS*:* whether, dial or stem (alcohol) are used to measure the temperature during storage of vaccines. Alcohol thermometers are more sensitive and accurate as they can record temperatures from – 50^0C to + 50^0C and can be used for ILRs and deep freezers.

Figure 4.6: Correct use of Thermometers



Keep the booklet of 12 monthly temperature recording forms on the top of each unit and check daily to see that the temperature record is maintained as given in *Figure 4.7.*

Figure 4.7: Temperature Record



UNIVERSAL IMMUNIZATION PROGRAMME

Daily Temparature Monitoring chart for ILR

Month/Year: March 2008 — Facility Name: Salumbar PHC

RECORD TEMPERATURE DAILY AT 10.00 AM AND 04.00 PM

Date | C | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31

UNSAFE: 13, 12, 11, 10, 9

SAFE: 8, 7, 6, 5, 4, 3, 2

UNSAFE: 1, 0, -1, -2, -3

Defrost Date

Power Breaks

Signature of MO

A. IS THE REFREGERATOR	Y	N
1. Level ?		
2. Away fron sunlight ?		
3. Locked ?		
4. Plugged permanatly ?		
5. Frost less than smm thick?		

B. ARE THE VACCINES	Y	N
1. Stacked neatly ?		
2. In the busket in ILR?		
3. FEFO Policy followed ?		
4. NOT Frozen in ILR?		
5. Within expiry date ?		

C. IS CONTINGENCY PLAN	Y	N
1. Available?		
2. Displayed?		

Record the details about the equipment (Make, Machine Number, Functional Status, date of breakdown, Date of Intimation and Date of Restoration) in Monthly PHC UIP Report. This will provide the information that is needed to schedule maintenance and repair and evaluate the adequacy of equipment.

Preventive Maintenance

Maintenance is performed to reduce the likelihood of equipment failure. Planning for maintenance includes identifying what needs to be done on a regular basis to clean the equipment and keep it running, ensuring that appropriate tools and spare parts are available, and scheduling these activities. Some types of equipment, (e.g. vaccine refrigerators) need daily, weekly, and monthly attention. Others (e.g. cold boxes and vaccine carriers) need maintenance after every use. (*See Table 4.3*). The cold chain technician should record regular preventive maintenance and minor repairs.

Remember to defrost ILRs and DFs if there is more than 0.5 cm of frost.

Table 4.3: Preventive Maintenance of Cold Chain Equipment

ILRs/DFs	Cold Boxes and Vaccine Carriers
Check Daily if ▪ Exterior is clean ▪ Temperature is within prescribed limits (twice daily) ▪ Seal is tight and door shuts	After every use ▪ Keep latches open and free from load and tension. ▪ Clean with detergent and dry ▪ Examine inside and outside surface for cracks ▪ Check that the rubber seal around the lid is not broken (if so, replace immediately) ▪ Hinges and locks are lubricated with machine oil.
Check Weekly if ▪ Frost is less than 0.5 cm thick (if more than 0.5 cm, then defrost)[9]	
Check Monthly ▪ If Equipment is defrosted and cleaned (adjust thermostat if necessary).	

[9] If you need to defrost your refrigerator more than once a month:
- you may be opening it too often (more than three times daily); or
- the door may not be closing properly; or
- the door seal may need to be replaced.

REPAIR

Repair is performed to fix equipment when it fails. Minor repair of cold chain equipment and accessories (such as fuse, faulty thermostat, starting relay, overload relay, three core wire, three-pin plug or door gasket etc.) can be usually handled at the Health Facility level with local resources. However, major repair of Cold Chain equipment (such as gas leakage in ILR/DF or faulty compressor) requires additional support from the district cold chain technician.

The Down Time of equipment should be less than two weeks for plains and three weeks for hilly terrain, whereas the Response Time should be 48 hours for plains and 72 hours for hilly terrains.

Cold Chain Sickness Rate[10] or the proportion of cold chain equipment out of order at any point of time, should be kept to the minimum acceptable level of less than 2%. An efficient Sickness reporting system contributes greatly to reduce the cold chain sickness rate by reducing the ***Down***

[10] E.g. if there are 100 ILRs/Freezers in a district and 7 are out of order, the cold chain sickness rate on that day is 7%).

Time[11] of the equipment. The down time should be less than two weeks for plains and three weeks for hilly terrain. The reporting should be direct from "who wants the service" to "who will provide the service", with information to other officers concerned. The aim is to maintain a ***Response Time***[12] of 48 hours for plains and 72 hours for hilly terrain.

Condemnation of Cold Chain Equipment: Cold chain equipment which is obsolete or unserviceable should be condemned according to State Government rules by state/district level committees. In the absence of state-specific rules for condemnation, follow the Rule 124 of General Financial Rules (GFR) and Government of India decisions read with Schedule VII of Delegation of Financial Power Rules.

PLANNING FOR EMERGENCIES

Plan for emergencies in advance, so that no time is lost during an emergency.

Equipment breakdown or electricity failure can interrupt immunization services. This can be minimized through plans for emergencies that have to be established in advance, at the PHC level, so that no time is lost during an emergency. Follow the steps outlined below to prepare a plan for emergencies:

- Make sure that the emergency plan is discussed and prepared by consulting staff and stakeholders.

[11] Down time refers to the time between breakdown of equipment and its repair or the period for which an equipment remains out of service (e.g. if an ILR is out of order on 10th April, and is functional again on 20th April, the down time is 10 days).

[12] The Response Time is the period between sending information regarding breakdown to actually attending (e.g. if information about the breakdown of an ILR is sent on 10th April and the ILR is attended to on 12th April by a mechanic , the response time is 2 days).

- Jointly identify a range of alternative storage arrangements for vaccines in the event of equipment breakdown or electricity failure of more than 24 hours. *Table 4.4* provides possible alternatives.
- Check identified alternative stores to ensure that they are functional, have adequate space and are capable of maintaining vaccines at the correct temperature. There is no point moving stock to another storage point only to find that all your freeze-sensitive vaccine is frozen and destroyed.

Table 4.4: Alternative Storage Arrangements for Emergencies

Equipment	Options
ILR	Store vaccines in cold boxes with conditioned icepacks. Place thermometer inside the cold box. OR Transfer to nearby PHC or other vaccine storage facility
Deep Freezer	Freeze icepacks in domestic refrigerator/s or in commercial ice factory. OR Collect required quantity of frozen icepacks from nearby PHC in cold boxes on session days. (Hold over time may not be same)
	At the district level, Transfer OPV to available ILR or refrigerator OR Store OPV in cold box lined with frozen icepacks or commercial ice in polythene bags.
Voltage Stabilizer	Disconnect the stabilizer and obtain replacement immediately from float assemblies[13] from District/Regional HQ and reconnect.

[13] A float assembly is a stock of spare units of cold chain equipment (at district/state headquarters) for immediate replacement of defective units (brought from the Primary Health Centers). The defective units once repaired go into the float assembly.

Table 4.5: Sample Emergency Plan for Vaccine Storage

PHC: Garhi, (Prepared: March 2008)

When to act:

- ILR / Deep Freezer breaks down OR
- Electricity failure of more than 24 hours

Who will act:

- Kashinath Soni (Health Assistant Male and Cold Chain Handler)

What to do:

ILR	Transfer vaccine to the cold box with conditioned icepacks. Place a thermometer inside the cold box.
Deep Freezer	Freeze icepacks in Kejriwal ice factory at Navapura. Contact person Ashutosh Kejriwal (Ph: XXXXX)

In case of ILR/DF breakdown, immediately inform:

Designation	Name	Phone (O)	Phone (R)/Mobile
MOPHC	Dr Bhawar Singh	XXXXX	XXXXX
DIO	Dr Rathore	XXXXX	XXXXX
District Cold Chain Technician	Sunil Kumar	XXXXX	XXXXX

Record details of breakdown in inventory register and UIP Monthly PHC Performance Report

- List out the resources and actions involved and the persons identified to carry them out.
- Include an updated list of emergency contact names, addresses and telephone numbers. Make sure that emergency contacts can be made both inside and outside normal working hours.
- Obtain appropriate approval from superiors
- Confirm the plan in writing and paste clear instructions in local languages on the cold chain equipment
- Make all who are concerned aware of the requirements and the activities that may be necessary during emergency and educate/train them accordingly.
- Do not wait until an emergency occurs. Rehearse the plans before they are needed.
- Periodically check availability of the identified requirement and ensure awareness of the persons concerned.

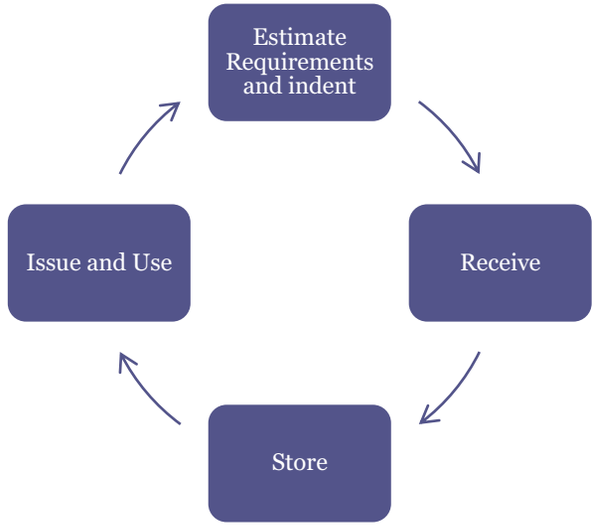
Managing Logistics of Vaccines and Other Supplies

Logistics management ensures regular and smooth flow of vaccines and other supplies to all health facilities. To ascertain that an appropriate amount of vaccine is always available, ensure that supplies are checked continuously, and records of all stock movements in and out of storage areas, are maintained.

Three commonly encountered problems in vaccine and logistics management are;

- **Stockout:** A condition when no stock is available of a vaccine or other supply.
- **Inadequate Stock:** less than the buffer stock (i.e. less than 25% for vaccines and 10% for syringes)
- **Excess Stock:** more than the requirement for one month, including the buffer stock (i.e. more than 125% for vaccines and 110% for syringes).

Logistics management is a cyclical process and involves several steps, namely demand estimation, indenting, receipt, storage and distribution of vaccines and other supplies to health facilities in a timely fashion and at an optimum cost.



Logistics management is a cyclical process of demand estimation, indenting, receipt, storage and distribution of vaccines and other supplies.

Step 1: Estimate requirements and indent

Compile the microplans of all the sub-centers at the PHC level and estimate the requirement of vaccines and other supplies. UIP requires that at the:

- PHC: 1 month of vaccines and supplies are stored
- District: 3 months of vaccines and supplies are stored

Furthermore, ensure that the overall estimate includes a buffer or safety stock (25% for vaccines and 10% for syringes). The ***buffer*** stock serves as a cushion or buffer against emergencies, major fluctuations in vaccine demands or unexpected transport delays.

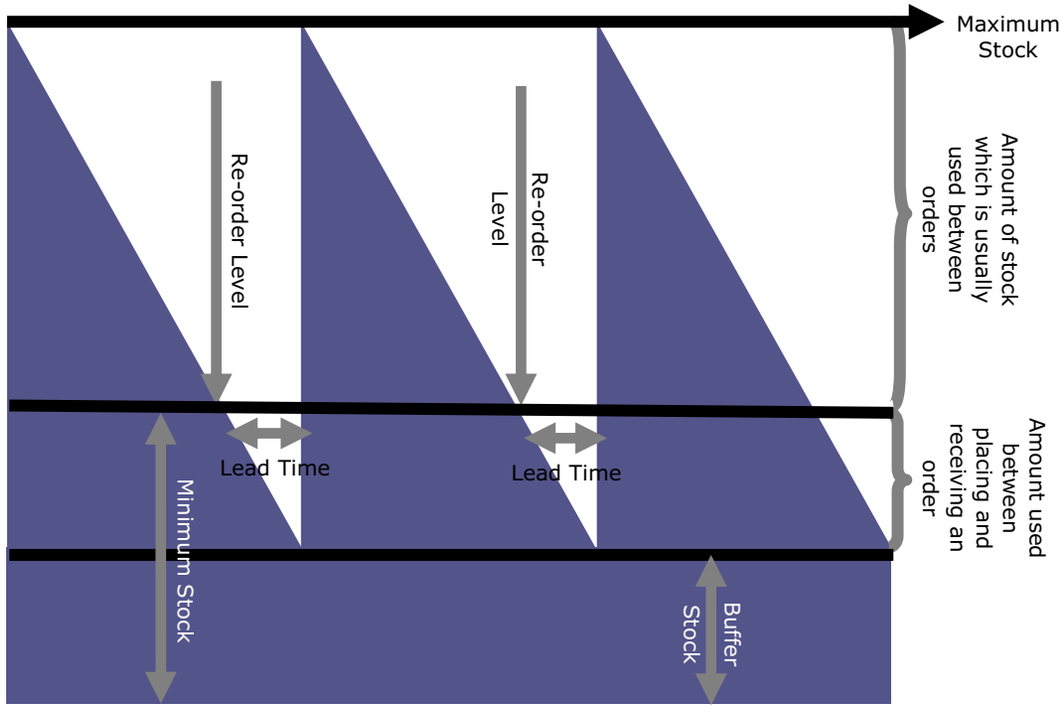
The minimum/ maximum inventory control system ensures that the quantity in hand is always between established maximum and minimum stock levels.

The problems of stockout, inadequate or excess stock can be avoided if a ***minimum/maximum inventory control system*** is implemented. This system ensures that the quantity in hand is always between established maximum and minimum stock levels.

The ***Minimum stock level*** (also known as the re-order level) implies the least amount that you should have in stock or the level which, when reached, initiates a re-order; usually expressed as the number of weeks/months of supply. It is the amount of stock you will use in the time between placing and receiving an order plus the buffer stock. The minimum stock level is the level below which stocks should never drop without having placed an order.

The ***Maximum stock level*** implies the largest amount of stock that you should have, usually expressed as the number of weeks/months of supply. It is the minimum stock plus the amount of stock used between orders. The maximum stock level is set to guard against excess stock which results in losing vaccines to expiration before use.

Figure 4.8: The relation between minimum, maximum and buffer stocks



The ***Lead time*** refers to the time between ordering of new stock and its receipt. The lead time varies, depending on the speed of deliveries, availability and reliability of transport, and sometimes the weather. For instance, if a PHC's monthly requirement of DPT is 280 doses, the Buffer Stock will be 70 doses (or 25% or one week's supply). Additionally, if the Lead Time is one week, then the Minimum Stock (or Re-order) Level is the stock for one week and the Buffer Stock (70 doses + 70 doses= 140 doses). The Maximum Stock Level, therefore, will be the Minimum Stock and the stock used between orders (140 doses + 3 weeks stock of 210 doses = 350 doses).

If the stock level falls to the re-order level, inform the district vaccine stores for replenishment and place an indent (*See Appendix 4.2*) to avoid any shortage or stock-out.

Step 2: Receive

During receipt, check and record the details of vaccines, diluents and other supplies and sign in the vaccine and logistics supply voucher. (*See Appendix 4.3*)

When the supplies reach the PHC, also enter the details in the vaccine and logistic stock register each time they arrive at the storage point, including Batch numbers, Expiry dates, VVM status, etc. (*See Appendix 4.4*)

Step 3: Store

Systematically arrange vaccines and supplies to facilitate issue of stocks whose expiry date is the closest i.e. distribute vaccine with the shortest shelf-life first, even if it arrived last. This system, commonly known as EEFO (Earliest- Expiry-First-Out) is preferable to FIFO (First-In-First-Out) handling.

Systematically arrange vaccines and other supplies in a fashion that facilitates issue of stocks whose expiry date is the closest.

While in storage, periodically conduct a physical inventory of all vaccines once every month and other supplies at least once every three months. Check and record the details at the bottom of the stock register.

Do not keep in the cold chain or include in the available stock balance, any expired vials, freeze-damaged vials or vials with VVMs beyond the discard point.

Include only vaccine stocks that are suitable for use and kept in the cold chain. Any expired vials, freeze-damaged vials or vials with VVMs beyond the discard point should not appear in the available stock balance and also should not be kept in the cold chain. If such vaccines have to be retained for some time, e.g. until accounting or auditing procedures have been completed, clearly mark/label them for discard.

Also record their details in the "remarks" column in the Stock Register until final disposal takes place.

Ensure that the following good storage practices are in place:

- *Stock security:* keep all vaccines and consumables under secure (lock and key) conditions.
- *Data security:* keep all records secure.
- *Orderliness:* store all vaccines, diluents and droppers and other consumables in an orderly fashion.
- *Cleanliness:* keep the vaccine store clean, dry and free of pests.
- *Supervision:* ensure that all staff is effectively supervised.
- *Accountability:* depute a person to manage stores.

Step 4: Issue and Use

Follow the earliest expiry, first out (EEFO) procedure during distribution. Follow the FIFO principle if all the vaccines and supplies are of the same shelf-life.

Check that the types and amount of vaccine, diluent and dropper are the same, as per microplan for that session site.

Check the status of randomly selected vials for intact labels, expiry date, VVM and freezing.

Check and record details, in the stock register, of vaccines and supplies every time they leave the storage point for distribution to session sites and, eventually, the user. Calculate and record the end balance of the stock.

Ensure that the health worker is present to receive the stocks at the expected time of delivery. Record the issue of vaccines and supplies to each session site in the Vaccine and Logistics Issue Register (*See Appendix 4.5*) with the date, signature of delivery person, and signature of PHC official.

At the PHC level, ensure that doses used, discarded and returned to the PHC at the end of the session are recorded in the stock register.

"Bundling" or the simultaneous availability of a number of related supplies, ensures that vaccines are always supplied with diluents, droppers, AD syringes and reconstitution syringes, in corresponding quantities, at each level of the supply chain.

Since provision of immunization services depends on the simultaneous availability of a number of related supplies, shortage or stock-out of any of these negatively impacts the program. "**Bundling**" ensures that vaccines are always supplied with diluents, droppers, AD syringes and reconstitution syringes, in corresponding quantities, at each level of the supply chain. Also supply other related items (e.g. Tablet IFA, ORS) required for the conduct of Village Health and Nutrition Day.

And then re-start with Step 1: Estimate Requirements…

Before you indent the next batch of vaccine, conduct a physical inventory to make sure that the ledger is accurate, i.e. all supplies issued to sessions are accounted for. Before indenting additional supplies for the next month, subtract your End Balance from next month's stock requirements and include a 25% buffer stock.

Improving vaccine use and reducing wastage

Although a certain amount of wastage of vaccines and other supplies is expected at all levels of the program, indeed inevitable, good management can reduce avoidable wastage. *Table 4.8* lists the types of wastage commonly encountered, both avoidable and unavoidable in opened andnopened vials.

Table 4.8: Common Types of Vaccine Wastage

	Unopened Vials	Opened Vials
Unavoidable wastage		Discarding remaining doses at end of session Reconstituted vaccines that have to be discarded after four hours.
Avoidable wastage	Unused vials thrice returned from outreach sessions. (Poor micro-planning regarding expected beneficiaries). Expiry (Poor stock management) VVM in discard stage, Frozen T series vaccines (Cold chain failure) Breakage, Loss, Theft (Poor Store Management)	Drawing more doses from a vial (Incorrect dosage) Suspected contamination (Poor reconstitution practices)

Regular calculation of vaccine usage/wastage rates (sub-center wise) helps in pointing out the source of wastage and in taking appropriate corrective action. Calculate wastage of vaccines and other supplies with the help of the following formula:

Vaccine wastage rate =100 –Vaccine Usage Rate

OR

Vaccine wastage rate =100 – $\frac{\text{Doses administered}}{\text{Doses Issued}}$ x 100[14]

Five "RIGHTS" Ensure Quality Vaccines and Supplies

- The **RIGHT** goods
- In the **RIGHT** quantities
- In the **RIGHT** condition

delivered . . .

- To the **RIGHT** place
- At the **RIGHT** time

The goal is to immunize the maximum number of infants and pregnant women. Encourage HWs to not hesitate in opening a new vial of vaccine for even one beneficiary. They may not have another opportunity to provide a dose to that infant or pregnant woman.

14 This includes doses used for immunization and all doses discarded or lost for any reason (expiry, unusable VVM, frozen T-series, loss, theft or routine discard of opened vials at the end of sessions.

APPENDIX 4.1: CHECKING FOR COLD DAMAGE -THE SHAKE TEST

The shake test is designed to determine whether adsorbed vaccines (DPT, DT, TT or Hepatitis B) have been frozen at some point of time in the cold chain. Once the vaccine is frozen it tends to form flakes which gradually settle to the bottom after the vial is shaken. Sedimentation occurs faster in a vaccine vial which has been frozen as compared to a vaccine vial which has not been frozen.

Conduct the shake test if you suspect that vials could have been frozen if:

- the temperature goes below recommended ranges
- Freeze-sensitive vaccines are stored below the basket of ILR.

Step 1: Take a vial of vaccine of the same batch number and from the same manufacturer as the vaccine you want to test, and freeze the vial until the contents are solid (at least 8 hours at -18°C). Let the vial thaw by keeping it at room temperature until it becomes liquid. Label the vial as "control" clearly so that it is easily identifiable and will not be used. Similarly label the test (suspect vial)

Step 2: Hold the "control" and "test" samples together in the same hand and shake vigorously for 10 to 15 seconds.

Step 3: Place both the vials on a table and do not move them further.

Step 4: View both vials against the light to compare their sedimentation rates.

- If the test sample shows a much slower sedimentation rate than the control sample, the test sample has most probably not been frozen and can be used.
- If the sedimentation rate is similar or more, the vial has probably been damaged by freezing and should not be used. Record the details in the stock register.

Note: Some vials have large labels which conceal the vial contents. This makes it difficult to see the sedimentation process. In such cases, turn the control and test vials upside down and observe sedimentation taking place in the neck of the vial.

APPENDIX 4.2: VACCINE & LOGISTICS INDENT FORM

(Copy for Record for Requester)				***(Copy for Record for Receiver)***			
Indent No.:	**Date:**			**Indent No.:**	**Date:**		
From:				**From:**			
To:				**To:**			
Item	**Total amount received in current year**	**Balance available on date of indent**	**Amount requested**	**Item**	**Total amount received in current year**	**Balance available on date of indent**	**Amount requested**
BCG *(doses)*				BCG *(doses)*			
tOPV *(doses)*				tOPV *(doses)*			
DPT *(doses)*				DPT *(doses)*			
Measles *(doses)*				Measles *(doses)*			
DT *(doses)*				DT *(doses)*			
TT *(doses)*				TT *(doses)*			
BCG Diluent *(amp)*				BCG Diluent *(amp)*			
Measles Diluent *(amp)*				Measles Diluent *(amp)*			
0.1ml AD Syringes				0.1ml AD Syringes			
0.5 ml AD Syringes				0.5 ml AD Syringes			
5 ml Disposable Syringes				5 ml Disposable Syringes			
VitA Syrup				VitA Syrup			
Signature of Receiver:		**Signature of Requester:**		**Signature of Receiver:**		**Signature of Requester:**	
Name:		**Name:**		**Name:**		**Name:**	
Designation:		**Designation:**		**Designation:**		**Designation:**	
Address:		**Address:**		**Address:**		**Address:**	

APPENDIX 4.3: VACCINE & LOGISTICS SUPPLY VOUCHER

(Copy for Record for Supplier)				***(Copy for Record for Receiver)***			
Supply Voucher No.:	**Date:**			**Indent No.:**	**Date:**		
Reference Indent No:	**Dated:**	**Received on:**		**Reference Indent No:**	**Dated:**	**Received on:**	
To:				**To:**			

	Item	Amount Released	Batch No.	Expiry Date (VVM status for OPV)	Remarks		Item	Amount Released	Batch No.	Expiry Date (VVM status for OPV)	Remarks
1	BCG *(doses)*					1	BCG *(doses)*				
2	tOPV *(doses)*					2	tOPV *(doses)*				
3	DPT *(doses)*					3	DPT *(doses)*				
4	Measles *(doses)*					4	Measles *(doses)*				
5	DT *(doses)*					5	DT *(doses)*				
6	TT *(doses)*					6	TT *(doses)*				
7	BCG Diluent *(amp)*					7	BCG Diluent *(amp)*				
8	Measles Diluent *(amp)*					8	Measles Diluent *(amp)*				
9	0.1ml AD Syringes					9	0.1ml AD Syringes				
10	0.5 ml AD Syringes					10	0.5 ml AD Syringes				
11	5 ml Disp.Syringes					11	5 ml Disp. Syringes				
12	VitA Syrup					12	VitA Syrup				

Received above vaccines and logistics in quantity mentioned and in good condition.	Received above vaccines and logistics in quantity mentioned and in good condition.

Signature of Receiver:	**Signature of Store in Charge:**	**Signature of Receiver:**	**Signature of Store in Charge**
Name:	**Name:**	**Name:**	**Name:**
Designation:	**Designation:**	**Designation:**	**Designation:**
Address:	**Address:**	**Address:**	**Address:**
Remarks:		**Remarks:**	

APPENDIX 4.4: STOCK REGISTER

(Note: all figures should be in doses, not in number of vials)
Name of Item: DPT Storage Location: Garhi PHC Year: 2008

Date and Month	Opening Balance	Received						Issued						Loss /Adjustment Quantity	Returned Unused	End Balance	Remarks	Signature of IO/ICC
		From (Supplier)	Received Quantity	Batch No.	Expiry Date	VVM Status	Freeze Status*	To (Name of Facility)	Issued Quantity	Batch No.	Expiry Date	VVM Status	Freeze Status*					
1/2	100	District Stores	270	AG-100420	Dec 2009	N.A.	Liquid									370		
6/2								Sessions	70	AG-100420	Dec 2009	N.A.	Liquid		10	310		
13/2									70	AG-100420	Dec 2009	N.A.	Liquid	10		230	Broken	
20/2									70	AG-100420	Dec 2009	N.A.	Liquid		10	170		
27/2									70	AG-100420	Dec 2009	N.A.	Liquid			100		
Total	100		270						280					10	20			

*Only for TT, DPT, DT and HepB vaccines

On the last working day of every month, provide the following summary of the stock position:

End Balance=

(Opening Balance: 100 + Total Received during the month: 270+ Returned Unused: 20)
–(Total Issued During the Month: 280 + Loss/Adjustment: 10)
= 100

Indent for Next Month =

(Monthly Requirement: 280 + 25% Buffer Stock: 70) – End Balance: 100
= 250

Monthly Physical Verification by Medical Officer

Remarks:_____

Date:_____ Name and Signature:_____

APPENDIX 4.5: VACCINE & LOGISTICS ISSUE REGISTER

Date (DD/MM /YY)	Doses of Vaccines (D: Distributed; R: Returned)														Number of Ampoules				Number of Syringes						Village/Site for distribution	Delivery Mode	Name of HW	Receiver Signature	IO/ICC Signature	Supervisor Signature
	BCG		DPT		tOPV		Hep B		Measles		TT		DT		BCG Diluent		Measles Diluent		0.1 ml ADS		0.5 ml ADS		5 ml Disp.							
	D	R	D	R	D	R	D	R	D	R	D	R	D	R	D	R	D	R	D	R	D	R	D	R						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
TOT.																														

UNIT 5

Safe Injections and Waste Disposal

LEARNING OBJECTIVES

1. To describe the importance and advantages of safe injections and safe disposal of immunization waste.
2. To list steps to achieve safe injections and safe disposal of immunization waste according to existing GoI guidelines.

The cardinal rule of health care is ***"first, do no harm."*** Yet, unsafe injection practices pose serious health risks to recipients, health workers, and the general public. 95% injections are administered for therapeutic purposes, rather than for immunization and many of these "curative" injections may be unnecessary, ineffective, or inappropriate. The provision of auto disable syringes by the Government of India and the implementation of Central Pollution Control Board (CPCB) outlined waste management procedures are attempts to improve injection safety in the immunization program.

Unsafe injection practices pose serious health risks to recipients, health workers, and the general public.

Safe Injections

An ***unsafe injection*** is an injection that can potentially harm the recipient, the health worker or the community.

They are at risk of contracting deadly diseases, such as hepatitis B, Hepatitis C and HIV as well as parasitic, fungal, bacterial and other types of infections. *Table 5.1* describes the common reasons for and solutions to unsafe injection practices.

Table 5.1: Common Reasons and Solutions for Unsafe Injection Practices

Reasons	**Solutions**
Supplies are low or erratic	Ensure injection safety through a continuous supply of injection safety equipment (e.g. AD syringes, reconstitution syringes, hub-cutters and waste disposal bags).
Health workers have not been trained in correct use of this equipment or in disinfection and safe disposal of immunization waste. They recap or bend used needles, causing needle-stick injuries	Provide continuous education on injection safety to all health workers, whether or not, they directly administer injections. Distribute available job-aids to all health functionaries to remind them of the best-practices in the correct use of AD Syringes and the hub cutter and in simple ways to improve injection safety (*See Figures 5.1, 5.2 and 5.3)*

Figure 5.1: Correct use of AD syringes

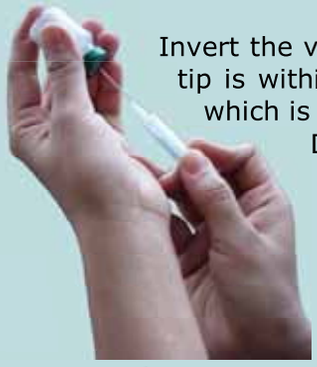
Select the correct syringe for the vaccine to be administered (BCG 0.1ml and all others 0.5ml).

Check the packaging. Don't use if the package is damaged, opened, or expired.

Peel open or tear the package from the plunger side and remove the syringe by holding the barrel. Discard the packaging into a black plastic bag.

Remove the needle cover/ cap and discard it into the black plastic bag.

Do not move the plunger until you are ready to fill the syringe with the vaccine and do not inject air into the vial as this will lock the syringe.



Invert the vial, and insert the needle into the vial through the rubber cap, such that the tip is within the level of the vaccine. If inserted beyond you may draw an air bubble which is very difficult to expel.

Do not touch the needle or the rubber cap (septum) of the vial.

Pull the plunger back slowly to fill the syringe. The plunger will automatically stop when the necessary dose of the vaccine has been drawn (0.1 or 0.5 ml).

Do not draw air into the syringe.

In case air accidentally enters the syringe, remove the needle from the vial.

Holding the syringe upright, tap the barrel to bring the bubbles towards the tip of syringe.

Then carefully push the plunger to the dose mark (0.5 or 0.1 ml) thus expelling the air bubble.

If the injection site is dirty then clean it with a clean water swab and administer the vaccine. (BCG: Left upper arm; DPT, DT and Hep B: Antero-lateral aspect (outer side) of mid thigh Measles: Right upper arm; TT: Upper arm)

Push the plunger completely to deliver the dose. Do not rub the injection site after vaccine is given.

Figure 5.2: Correct use of Hub-cutters

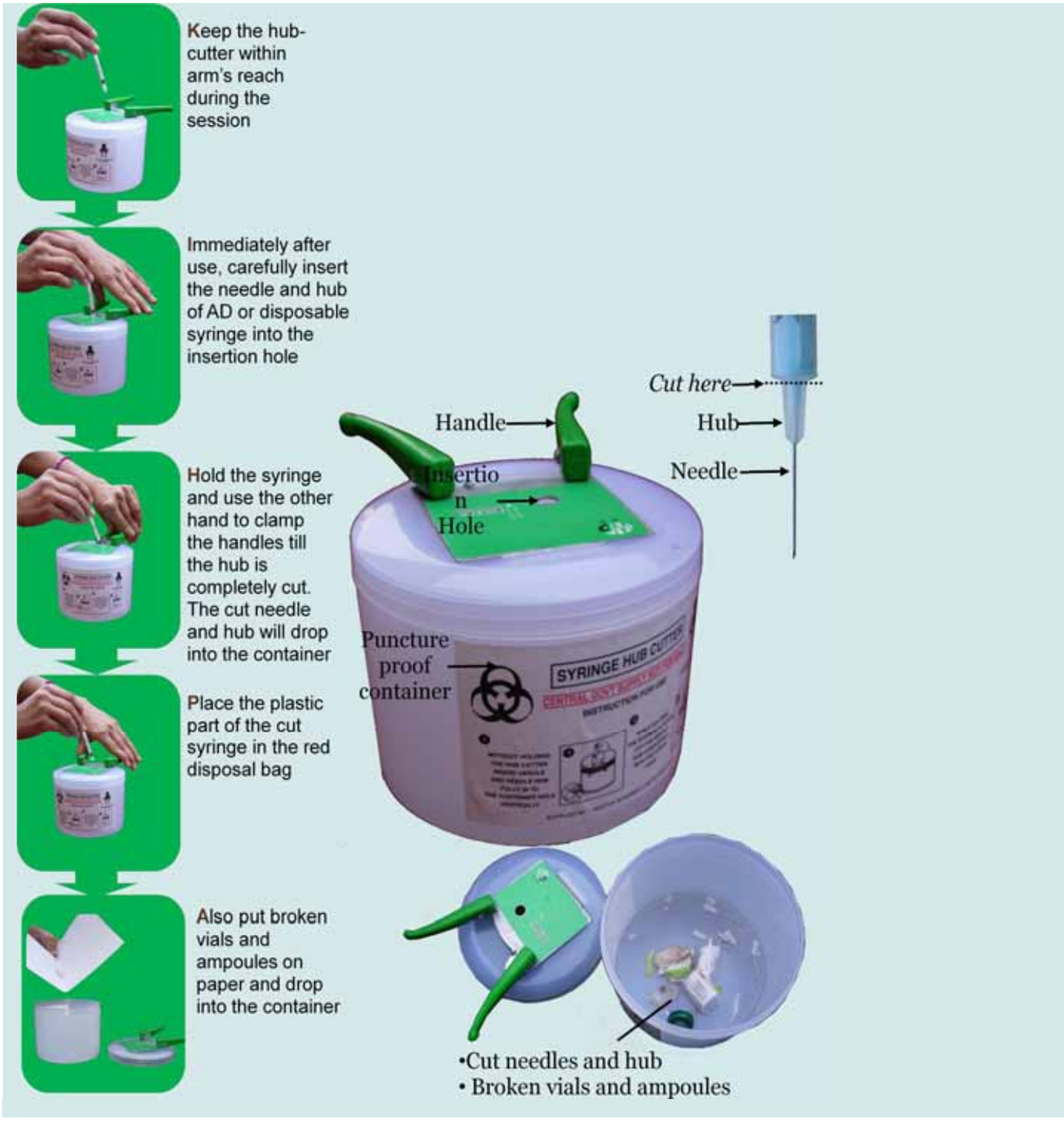


Figure 5.3: Simple ways to improve injection safety

Keep hands clean before giving injections

Cover any small cuts on the service provider's skin.
Wash or disinfect hands prior to preparing injection material.

Use sterile injection equipment

Always use an ADS for each injection and a *new disposable syringe* to reconstitute each vial of BCG and measles

Prevent the contamination of vaccine and injection equipment

Avoid giving injections if the skin of the recipient is infected or compromised by local infection (such as a skin lesion, cut, or weeping dermatitis).
Prepare each injection in a clean area where contamination from blood or body fluid is unlikely.
If the injection site is dirty, wash with clean water
Follow product-specific recommendations for use, storage, and handling of a vaccine.

Discard any needle that has touched any non-sterile surface.

Discard a syringe that has been punctured, torn or damaged by exposure to moisture

Consider all used equipment as contaminated

Cut the used syringe at the hub immediately after use.

Practice safe disposal of all sharps

Deposit used sharps (needles) in a hub cutter and send to the PHC for disinfection and safe disposal.

Prevent needle-stick injuries

Do not recap or bend needles.

Collect sharps in the Hub cutter.

Anticipate sudden movement of child.

Safe disposal of immunization waste

Unsafe disposal of immunization waste poses:

Dangers to health: Throwing used needles in open pits can put the community at risk of acquiring infection. Usually children, rag pickers and animals are the unfortunate victims of needle-stick injury from unsafe disposal of needles and other sharps.

Dangers to the environment: Due to the significant environmental risks posed by the unsafe disposal of immunization waste, CPCB disallows:

- throwing used needles and syringes in the open
- burying used needles and sharps
- burning immunization waste.

Never throw in the open used syringes, used unbroken vials, broken vials and ampoules, caps and wrappers. **Never burn** immunization waste. **Never bury** used syringes and used needles. **Never store** returned waste at Health facility for long. Dispose periodically

Steps to ensure safe disposal of immunization waste

The CPCB outlines the following Guidelines for disposal of biomedical waste generated during immunization under UIP.

The concerned CMO or the officer responsible for implementation of UIP in the respective area, as decided by the MoHFW, will obtain authorization from the "Prescribed Authority", notified under the Bio-medical Waste (Management & Handling) Rules[15] for generating, collecting, receiving, storing, transporting, treating, disposing and/or handling bio-medical waste in any other manner.

Disposal of bio-medical waste generated at Outreach Points/PHCs/ CHCs/ District Hospitals etc.

Step 1: At the session site, cut the needle of the AD syringe immediately after administering the injection, using the Hub cutter that cuts the plastic hub of the syringe and not the metal part of needle. The cut needles will get collected in the puncture-proof translucent container of the hub-cutter.

Step 2: Store the broken vials in a separate white translucent sturdy and puncture proof container or in the same hub-cutter, in case its capacity is also able to accommodate broken vials.

Step 3: Segregate and store the plastic portion of the cut syringes and unbroken (but discarded) vials in the red bag or container. Both the containers should bear the biohazard symbol as stipulated in the Schedule III of the BMW Rules.

Biohazard

15 i.e. State Pollution Control Board/ Committee

Step 4: Send the collected materials to the Common Bio-medical Waste Treatment Facilities (CBWTF). If the CBWTF doesn't exist then, go to step 5.

Step 5: Treat the collected material in an autoclave. If it is unable to impart autoclaving, boil the waste in water for at least 10 minutes or provide chemical treatment (using at least 1% solution of sodium hypochlorite for 30 minutes). Ensure that these treatments result in disinfection. However, the District Hospital/CHC/PHC etc. will ultimately make the necessary arrangements to autoclave on a regular basis.

Step 6: Dispose the autoclaved (or boiled/chemically disinfected) waste as follows:

- Dispose the needles and broken vials in a safety pit/tank
- Send the syringes and unbroken vials for recycling or landfill.

Step 7: Wash properly the containers properly for reuse.

Step 8: Maintain a proper record of generation, treatment and disposal of waste at the District Hospitals/CHC/PHC/etc. in order to assess that waste (needles/syringes/vials) reported back to District Hospital/CHC/PHC matches with the stock issued to Health Workers at the beginning of the session day. Match by weighing rather than counting in order to avoid occupational and safety hazards. This would enable preparation of annual reports, submitted to the "Prescribed Authority" by 31st January of every year. These steps can be easily summarized in the *Figure 5.4.*

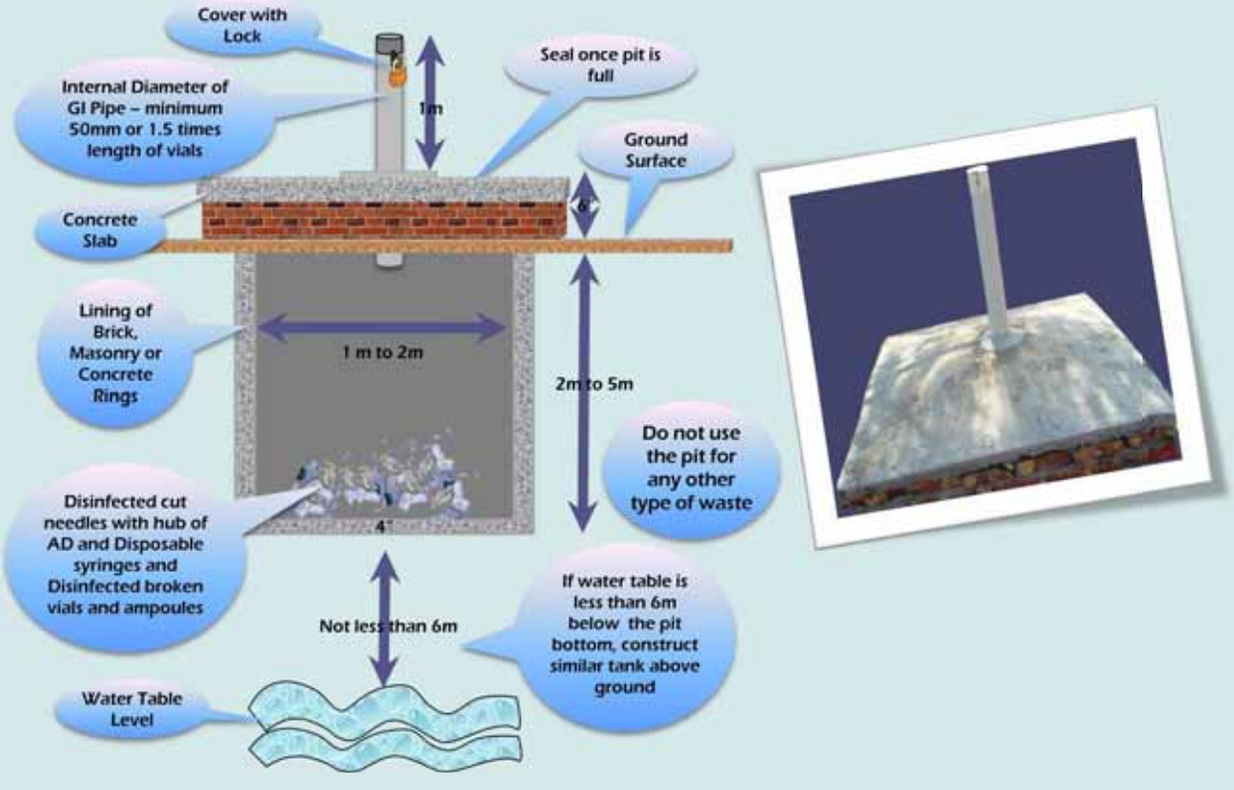
Figure 5.4: Safe disposal of immunization waste

To prepare **1% Hypochlorite solution,** dissolve 10-15g or 1 tablespoonful of bleaching powder in 1 liter of water, in a well ventilated area. Chlorine solutions gradually lose strength, therefore prepare freshly diluted solutions daily. Use clear water, because organic matter destroys chlorine. Since this bleach solution is also caustic, avoid direct contact with skin and eyes. Use plastic containers as metal containers are corroded rapidly and also affect the bleach.

30 Lt. (24" x 28") **Red/ Black Plastic Bags** (Biodegradable). HDPE/LLDPE/PP made with virgin, non-chlorinated polymer material with minimum thickness of 55 micron, with easy to hold collar tie/knot arrangement and preprinted as per requirements of Bio Medical Waste Management Rules.

APPENDIX: 5.1 DESIGN OF THE PIT/TANK FOR DISPOSAL OF TREATED NEEDLES AND BROKEN VIALS (SHARPS)

The treated needles/broken vials should be disposed in a circular or rectangular pit as shown below. Such a rectangular or circular pit can be dug and lined with brick, masonry or concrete rings. The pit should be covered with a heavy concrete slab, which is penetrated by a galvanized steel pipe projecting for about 1 meter above the slab, with an internal diameter of up to 50 millimeters or 1.5 times the length of vials, whichever is more. The top opening of the steel pipe shall have a provision of locking after the treated waste sharps has been disposed in. When the pit is full it can be sealed completely, after another has been prepared. For high water table regions where water table is less than 6 meters beneath bottom of the pit, a tank with above mentioned arrangements shall be made above the ground.



UNIT 6

Adverse Events Following Immunization

LEARNING OBJECTIVES

1. To define Adverse Events Following Immunization (AEFIs) and describe types of AEFIs
2. To report, investigate and respond to AEFIs.
3. To list the roles and responsibilities of health functionaries at all levels in managing AEFIs

An adverse Event Following Immunization (AEFI) is defined as a medical incident that takes place after an immunization, causes concern, and is believed to be caused by immunization. AEFIs, particularly when they are not properly managed, represent a genuine threat to the immunization program and, in some cases, to the health of the beneficiaries. It is important that AEFIs are detected, investigated, monitored and promptly responded to for corrective interventions.

Types of AEFI

Encourage Field workers to report AEFIs without fear of penalty. The aim is to improve systems to prevent/minimize further AEFI and not to blame individuals.

AEFIs may be reported as individual cases or clusters. A cluster is defined as two or more cases of the same or similar events, which are related in time, and have occurred within specific geographical area, or associated with the same vaccine, the same batch number or the same vaccinator. For example, two or more cases of abscess occur in a village following an immunization session (with one or more vaccinators) or multiple abscess cases following

immunization by the same vaccinator or the same batch of the vaccine, but in different villages.

AEFIs can be classified into five types as described in *Table 6.1.*

Table 6.1: Types of AEFIs

Type	Definition	Example
	***1. Vaccine reaction*** An event caused or precipitated by the active component or one of the other components of the vaccine (e.g. adjuvant, preservative or stabilizer). This is due to the inherent properties of the vaccine.	High grade fever following DPT vaccination
	***2. Program Error*** An event caused by an error in vaccine preparation, handling or administration.	Bacterial abscess due to un-sterile injection
	***3. Coincidental*** An event that occurs after immunization but is not caused by the vaccine. This is due to a chance temporal association	Pneumonia after oral polio vaccine administration
	***4. Injection Reaction*** Event caused by anxiety about, or pain from the injection itself rather than the vaccine	Fainting spell in a teenager after immunization
	***5. Unknown*** The cause of the event cannot be determined	

Vaccine reactions

These may be classified into common, minor reactions or rare, more serious reactions.

Common, minor vaccine reactions such as local reaction (pain, swelling and/or redness), fever and systemic symptoms (e.g. vomiting, diarrhoea, malaise) can result as a part of the immune response. In addition, some of the non-antigenic vaccine components (e.g. adjuvants, stabilizers or preservatives) can lead to reactions. An ideal vaccine reduces these reactions to a minimum while producing the best possible immunity.

Local reactions and fever should be anticipated in only 10% of the vaccine recipients, except in the case of whole cell DPT which produces fever in nearly half of those vaccinated. Fever and minor local and systemic reactions usually occur within a day or two of immunization (except for those produced by measles/MMR vaccine which occurs 6 to 12 days after immunization) and only last for few days. Fever and minor local reactions can usually be treated symptomatically with paracetamol.

Rare serious vaccine reactions such as high (39 - 40.4^{o}C/ 102-104.7 ^{o}F) to extreme fevers (>40.5^{o}C /105 ^{o}F) may indicate the possibility of:

- Sepsis or Toxic Shock Syndrome (TSS) resulting from a program error; or

- A coexisting illness and other accompanying signs.

Table 6.2 summarizes the rare serious vaccine reactions. Case definitions for these reactions are in Appendix *6.3*. Anaphylaxis, the most serious of these reactions and potentially fatal, is treatable without leaving any long-term effects (*Appendix 6.4*). Although encephalopathy is included as a rare reaction to measles or DPT vaccine, a causal link with these vaccines has not been fully proven.

Table 6.2 : Summary of Rare Serious AE, onset interval and rate

Vaccine	Reaction	Interval between vaccination and onset	Number of events per million doses
BCG	Suppurative adenitis	2-6 months	100-1000
	BCG Osteitis	Up to several years	-
	Disseminated BCG infection	1-12 months	-
Hib	None known	-	-
Hep B	Anaphylaxis	0-1 hour	1-2
Measles/MMR[a]	Febrile seizures	5-12 days	330
	Thrombocytopenia (low platelets)	60 days	30
	Anaphylaxis	0-1 hour	1
OPV	Vaccine-Associated Paralytic Poliomyelitis	4-30 days	Up to o.4 [b]
Tetanus	Brachial Neuritis	2-28 days	5-10
	Anaphylaxis	0-1 hour	1-6
	Sterile abscess	1-6 weeks	6-10
DPT	Persistent (>3hours) inconsolable screaming	0-48 hours	1,000-60,000
	Seizures	0-3 days	600[c]
	Hypotonic Hypo Responsive Episode (HHE)	0-24 hours	30 - 990
	Anaphylaxis/Shock	0-1 hour	1 -6
Japanese Encephalitis	Serious allergic reaction	0 – 2 weeks	10 - 1000
	Neurological event	0 – 2 weeks	1 – 2.3

[a] Reactions (except anaphylaxis) do not occur if already immune (~ 90% of those receiving a second dose): children over six years are unlikely to have febrile seizures
[b] VAPP risk is higher for first dose (12 per 1.4 to 3.4 million doses) compared to 1 per 5.9 million for subsequent doses and 1 per 6.7 million doses for subsequent contacts.
[c] Seizures are mostly febrile in origin, and the rate depends on past history, family history and age, with a much lower risk in infants under the age of 4 months.

Program Errors

Adverse events can occur as a result of inappropriate storage, handling, preparation and administration of vaccines. The most common program error is infection as a result of non-sterile injection or poor injection technique. The infection can manifest as a ***local reaction*** (e.g., suppuration, abscess), ***systemic effect*** (e.g., sepsis or toxic shock syndrome), or ***blood-borne virus infection*** (e.g., HIV, Hepatitis B or Hepatitis C).

A program error may lead to a cluster (2 or more cases) of adverse events associated with a particular vaccine provider, or health facility, or even a single vial of vaccine that has been inappropriately prepared or has been contaminated. Program errors can also affect many vials (e.g. freezing of freeze-sensitive vaccines leading to an increase in local reactions).

Common Program Errors (*See Table 6.3*) can usually be prevented through training of health workers, regular supervision and an adequate supply of equipment for safe immunization injections.

Table 6.3: Common Program errors leading to AEFIs		
Program Errors		**Possible AEFI**
Non-sterile injection		
	▪ Contact of needle with unsterile surface e.g. finger, swab, table etc. ▪ Contaminated vaccine or diluent ▪ Administering injection over clothes	 Infection e.g local abscess at site of injection, sepsis
	▪ Use of reconstituted vaccines beyond the stipulated 4 hours ▪ Reuse of reconstituted vaccine at subsequent sessions	Toxic shock syndrome or death.
	▪ Reuse of disposable syringe & needle	 Blood-borne infections e.g Hep B, HIV, Hep C etc., abscess
Reconstitution error/ Wrong vaccine preparation		
	▪ Reconstitution with incorrect diluent	Less vaccine effectiveness
	▪ Drug substituted for diluent	Drug reaction; Death
	▪ Inadequate shaking of T-series vaccines	Local abscess
Injection at incorrect site/route		
	▪ Injection into gluteal region (buttocks)	 Sciatic nerve damage, paralysis
	▪ BCG/T series vaccine given subcutaneously	Local reaction or abscess
Vaccine transportation/storage incorrect		
	▪ Administration of frozen and thawed freeze-sensitive vaccine	Local reaction such as sterile abscess
Contraindications ignored		
	▪ DPT2 given after H/O convulsions with DPT1	Convulsions

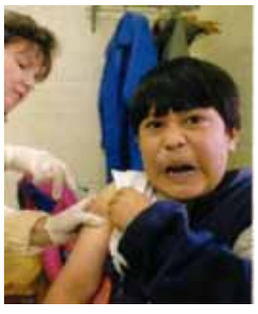
Coincidental Events

Coincidental events have only a temporal association with vaccination and are not causally related. They are likely if:

- The same or a similar event also affected others in the same age group around the same time, but they did not receive the suspect vaccine(s).
- There is clinical/ laboratory evidence that the event is not related to immunization.

Once an event is established as coincidental (e.g. pneumonia) no further investigation is required, other than what would be needed for the clinical management of the case. However, certain serious events may be blamed on the vaccine by the community because of the close temporal association with immunization, especially if the vaccinated individual was previously healthy. Ensure appropriate follow-up communication with the affected group or community to avoid misunderstanding or negative rumors.

Injection Reactions



Vaccinated children or adults can react in anticipation to and as a result of an injection of any kind. This reaction is unrelated to the content of the vaccine.

Examples of injection reactions include fainting, light-headedness, dizziness, tingling around the mouth and in the hands, and breath-holding in younger children, which in some cases can lead to unconsciousness.

Minimize overcrowding by proper planning of the immunization sessions and informing parents in advance about the time they should arrive for vaccination. This is likely to reduce the likelihood of such an event occurring by creating a calmer environment.

Unknown

Unknown AEFIs imply that the cause of the event cannot be determined. Rule out all the above mentioned causes before reaching this conclusion.

Reporting AEFIs

Figure 6.1 and Table 6.4 summarize the AEFIs that should be reported, methods, responsibilities and periodicity of reporting.

Figure 6.1: Reporting for Serious AEFIs

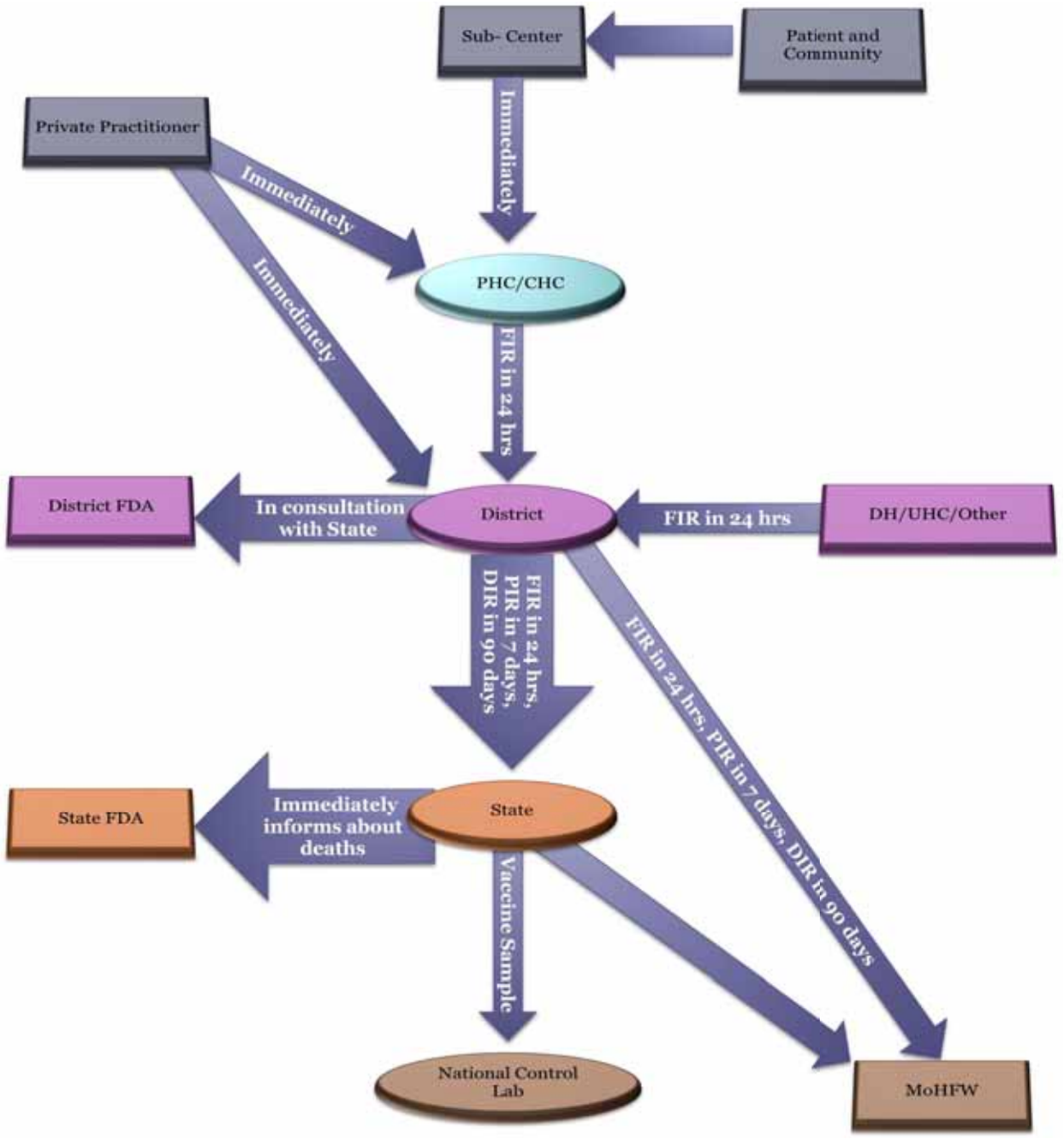


Table 6.4: Reporting of AEFIs

What to report	How to report	Who reports to Whom	When to report
For Immediate Reporting and Investigation ▪ Death, hospitalization, disability or other serious and unusual events that are thought by HWs or the public to be related to immunization ▪ Anaphylaxis ▪ Toxic shock syndrome (TSS) ▪ Anaphylactoid (acute hypersensitivity) reaction ▪ Acute Flaccid Paralysis[16] (AFP) ▪ Encephalopathy ▪ Sepsis ▪ Any event where vaccine quality is suspected ▪ Events occurring in a cluster	Telephone or any other quick means of communication	↓ HWs ↓ MO ↓ DIO/CMO ↓ SIO	Immediately
	First Information Report (FIR). *See Appendix 6.1.*	MO to DIO	Within 24 hrs to District and 48 hrs to GOI
	Preliminary Investigation Report (PIR). *See Appendix 6.2.*	MO / DIO to GoI	Within 7 days
	Detailed Investigation Report (DIR)	AEFI investigation team to GoI	Within 90 days

For Routine Monthly Reporting
▪ Deaths
▪ Injection site abscesses
▪ Other complications:
  ▪ Persistent (> 3 hrs) inconsolable screaming
  ▪ Hypotonic hypo-responsive episode (HHE)
  ▪ Severe local reaction
  ▪ Seizures including febrile seizures
  ▪ Brachial neuritis
  ▪ Thrombocytopenia
  ▪ Lymphadenitis
  ▪ Disseminated BCG infection
  ▪ Osteitis / Osteomyelitis
  ▪ Events occurring in cluster or causing significant parental or community concern
	UIP Report	HWs to MO	Monthly

		MO to DIO/CMO	
		DIO/CMO to SIO	

[16] Any case of AFP will be reported through the current system for AFP surveillance and reporting

Investigating AEFIs

On receiving reports of AEFIs from public or private sources, regarding both NIS and non-NIS vaccines, you should conduct an investigation to:

- confirm the reported diagnosis of AEFI and clarify the details and outcome;
- determine whether unimmunized persons are experiencing the same medical event(s);
- investigate the link between the vaccine given and the AEFI;
- determine the contribution of operational aspects of the program to the reported AEFI;
- determine whether a reported event was isolated or part of a cluster;
- determine the cause of the AEFI to provide the best intervention/ medical care and take further actions deemed necessary.

When an investigation is deemed necessary, initiate it urgently to determine the cause (where possible) and, in some cases, prevent additional cases.

Identify system problems rather than finding individuals to blame. Establish a working hypothesis as soon as there is sufficient information. You may change the working hypothesis during the course of your investigation. The focus of your investigation should then be to confirm the working hypothesis. Do not take action based on the hypothesis, until it is confirmed with reasonable certainty.

Request laboratory testing only on a clear suspicion and not as routine, and never before the working hypothesis has been formulated

Laboratory testing may sometimes confirm or rule out the suspected cause. The vaccine and diluent may be tested for sterility and chemical composition; and the needles and syringe for sterility. Request testing only on a clear suspicion and not as routine, and never before the working hypothesis has been formulated. Send ***unopened*** vaccine vials and matching diluent of the same batch for testing of a total of 50 ml (i.e. 10 vials for vaccines in 5ml vials and 5

vials for vaccines in 10 ml vials). Send vaccine samples for testing to the National Control Laboratory, Central Research Institute, Kasauli accompanied with a completed Lab Requisition Form (LRF) along with a copy of the available FIR/PIR. Send the samples in cold chain ($+2^0$C to $+8^0$C) and by fastest means, by a messenger or a courier agency with experience in transporting vaccines.

Roles and Responsibilities

ANMs should:

- Ask the beneficiaries to wait for half an hour after vaccination to observe for any AEFI.
- Leave the list of children vaccinated in a session with the AWW/ASHA and request them to be alert and report AEFIs. Share contact details of self and PHC.

Report deaths, injection site abscesses and other complications in the monthly UIP report. Mention in the report any non-occurrence of AEFI. A nil report is also important.

- Treat mild symptoms like fever, pain
- Report deaths, injection site abscesses and other complications in the monthly UIP report. Mention in the

report any non-occurrence of AEFI. A nil report is also important.

- Refer serious cases to MO (PHC) or to appropriate health facility for prompt treatment.
- Report serious events/ cluster of events immediately to the supervisor/ MO (PHC)/ DIO
- Record the time of opening/ reconstitution of vial on the vial label.
- Communicate with parents and other members of the community
- Assist in investigation of AEFIs

Health Supervisors should:

- Collect and review reports of AEFIs during their supervisory visits to immunization session sites/ SC.
- Provide on-the-job training to the field staff on safe injection practices and reporting.
- Assist the MO in collecting and compiling reports and in conducting the investigation.

MO PHC/ CHC should:

- Improve/arrange logistics to prevent AEFI due to program errors.
- Train staff in detecting, managing and reporting of AEFIs and differentiating between minor, non-significant AE and more serious events.
- Manage AEFIs and refer to the higher level, if required.
- Initiate investigation, when required
- Complete case report forms (FIR, PIR and DIR) and inform the DIO immediately for serious cases and deaths
- Report deaths, injection site abscesses and other complications in the monthly UIP report. Mention in the report any non-occurrence of AEFI. A nil report is also important.

Complete case report forms (FIR, PIR and DIR) and inform the DIO immediately for serious cases and deaths.

- Supervise all reported AEFI through site visits and give immediate feedback to health workers.
- Communicate with and share the conclusions and results of investigation with health workers and the community.

CMO/CS, DIO, RIT, MO at the district hospital should:

- Establish a functional district AEFI committee/regional investigation team.
- Train field staff in managing, investigating and reporting AEFIs.
- Identify a focal person for investigations.
- Identify a designated spokesperson to address the media if required
- Coordinate AEFI case management

- Report deaths, injection site abscesses and other complications in the monthly UIP report. Mention in the report any non-occurrence of AEFI. A nil report is also important.
- Investigate serious AEFIs and deaths (District AEFI committee/RIT in collaboration with State-level Investigation Teams)
- Immediately inform about serious AEFIs to the local FDA in consultation with the SIO
- Follow up reporting of serious AEFIs (FIR, PIR and DIR) and other cases (routine reports)
- Analyze the AEFI data through RIMS (maps and graphs) and disseminate this information to field personnel and state government.

APPENDIX 6.1: FIRST INFORMATION REPORT FORM (FIR)

FIRST INFORMATION REPORT FORM (FIR)

For Serious Adverse Events Following Immunization: Report within 48 hours to GoI

*(Fill in **BLOCK** letters only)*

Contact information of MO filling report

Medical Officer Name	Date	Contact Phone Number

State	Case Id
	IND (AEFI) / State Code / District Code / Year / Serial No.

District																									
Block																									
Date of Notification	d	d	m	m	y	y	y	y	Date of Investigation									d	d	m	m	y	y	y	y
Case Name																									
Date of Birth	d	d	m	m	y	y	y	y	Age (in months)									Sex	Male			Female			
Mother's / Father's Name																									

Complete Address of the Case with landmarks *(Street name, house number, village, block, Tehsil etc.)*

Hospitalization	Yes	No	Date of Hospitalization	d	d	m	m	y	y	y	y
Death	Yes	No	Date of Death	d	d	m	m	y	y	y	y	Time	..... am / pm
Date of vaccination	d	d	m	m	y	y	y	y	Time of vaccination	..... am / pm
Date of Onset of Symptoms	d	d	m	m	y	y	y	y	Time of Onset of symptoms	..... am / pm

Complete Address of site of vaccination

Detail of vaccine, diluent & Vitamin-A given

Vaccine	BCG	BCG Diluent	DPT	OPV	Hep B	DT	TT	Measles	Measles Diluent	Vit-A	Other
*Dose											
Manufacturer											
Batch Number											
Manufacture Date											
Expiry Date											

**Write the dose of the vaccine this child received on that day like 1st, 2nd, 3rd, booster and any other.*

Clinical History of Reaction	.....
Any other comment	.....

Contact Information of DIO/ District Nodal Officer Forwarding Report

Name & Sign	Date	Contact Phone Number

On completion, send form to Assistant commissioner (UIP), CH division of Govt. of India (Fax No. 011-23062728 or email aefiindia@gmail.com) and State Immunization Officer

APPENDIX 6.2: PRELIMINARY INFORMATION REPORT FORM (PIR)

PRELIMINARY INFORMATION REPORT FORM (PIR)

For Serious Adverse Events Following Immunization: (Report within 7 days to GoI, if FIR not sent earlier, send along with FIR)

*(Fill in **BLOCK** letters only)*

Contact information of MO filling report		
Medical Officer Name	Date	Contact Phone Number
State	Case Id	
	IND (AEFI) / State Code / District Code / Year / Serial No.	

District																									
Block																									
Date of Notification	d	d	m	m	y	y	y	y	Date of Investigation								d	d	m	m	y	y	y	y
Case Name																									
Date of Birth	d	d	m	m	y	y	y	y	Age (in months)								Sex	Male			Female				
Mother's / Father's Name																									

Complete Address of the Case with landmarks *(Street name, house number, village, block, Tehsil etc.)*

Hospitalization	Yes	No	Date of Hospitalization								d	d	m	m	y	y	y	y
Death	Yes	No	Date of Death	d	d	m	m	y	y	y	y	Time	..... am / pm						
Date of vaccination	d	d	m	m	y	y	y	y	Time of vaccination	..... am / pm								
Date of Onset of Symptoms	d	d	m	m	y	y	y	y	Time of Onset of symptoms	..... am / pm								

Complete Address of site of vaccination

Detail of vaccine, diluent & Vitamin-A given

Vaccine	BCG	BCG Diluent	DPT	OPV	Hep B	DT	TT	Measles	Measles Diluent	Vit-A	Other
*Dose											
Manufacturer											
Batch Number											
Manufacture Date											
Expiry Date											

**Write the dose of the vaccine this child received on that day like 1st, 2nd, 3rd, booster and any other.*

Clinical History of Reaction	....
Probable cause of death	.....
Probable cause of AEFI	Program error / Vaccine Reaction / Coincidental / Unknown

Further action planned:	Yes	No	if Yes, Details	
Whether vaccine sent to lab for investigation? *(If "Yes" send "LRF" along with this form.)*			Yes	No

Contact Information of DIO/ District Nodal Officer Forwarding Report		
Name & Sign	Date	Contact Phone Number

On completion, send form to Assistant commissioner (UIP), CH division of Govt. of India (Fax No. 011-23062728 or email aefiindia@gmail.com) and State Immunization Officer. Fill DIR within 3 months with the same case ID.

APPENDIX 6.3: CASE DEFINITIONS AND TREATMENTS FOR AEFI

AEFI	Case definition	Treatment	Vaccine
Vaccine associated paralytic poliomyelitis (presenting as AFP)	Acute onset of flaccid paralysis and neurological deficits, compatible with diagnosis of poliomyelitis, with isolation of vaccine virus and absence of wild virus in stool.	No specific treatment available; supportive care.	OPV
Anaphylactoid reaction (acute hypersensitivity reaction)	Exaggerated acute allergic reaction, occurring within 2 hours after immunization, characterized by one or more of the following: • wheezing and shortness of breath due to bronchospasm • laryngospasm/laryngeal oedema • One or more skin manifestations, e.g. hives, facial oedema, or generalized oedema. **Do not report less severe allergic reactions**	Self-limiting Anti-histamines may be Useful	All
Anaphylaxis	Severe immediate (within 1 hour) allergic reaction leading to circulatory failure with or without bronchospasm and/or laryngospasm/laryngeal oedema.	Adrenaline injection (See Appendix 6.4)	All
Disseminated BCG infections	Widespread infection occurring within 1 to 12 months after BCG vaccination and confirmed by isolation of Mycobacterium bovis BCG strain. Usually in immuno-compromised individuals.	Should be treated with anti-tuberculous regimens including isoniazid and rifampicin.	BCG
Encephalopathy	Acute onset of major illness characterized by any two of the following three conditions: • seizures • severe alteration in level of consciousness lasting for one day or more • Distinct change in behavior lasting one day or more. Needs to occur within 48 hours of DPT vaccine or from 7 to 12 days after measles vaccine, to be related to immunization.	No specific treatment available; supportive care.	Measles, Pertussis
Fever	The fever can be classified (based on rectal temperature) such as Mild fever: 100.4 ^{0}F to 102 ^{0}F (38 to 38.9 ^{0}C), High fever: 102 ^{0}F to 104.7 ^{0}F (39 to 40.4^{0}C) and Extreme fever: 104.7 ^{0}F or higher (>40.5^{0}C).	Symptomatic; paracetamol. Give extra oral fluids. Tepid sponge or bath. In cases of high and extreme fever, other signs and symptoms should be sought and reported/managed as appropriate.	All
Hypotonic, hypo responsive episode (HHE or shock-collapse)	Event of sudden onset occurring within 48 [usually less than 12] hours of vaccination and lasting from one minute to several hours, in children younger than 10 years of age. **All** of the following must be present: • limpness (hypotonic) •reduced responsiveness (hypo responsive) • pallor or cyanosis – or failure to observe/ recall	The episode is transient and self-limiting, and does not require specific treatment. It is **not** a contraindication to further doses of the vaccine.	Mainly DPT, rarely others

AEFI	Case definition	Treatment	Vaccine
Injection site abscess	Fluctuant or draining fluid-filled lesion at the site of injection. **Bacterial** if evidence of infection (e.g. purulent, inflammatory signs, fever, culture), **Sterile** abscess if no evidence of bacterial infection on culture. **Sterile abscesses are usually due to the inherent properties of the vaccine.**	Incise and drain; Antibiotics if bacterial.	All injectable vaccines
Lymphadenitis (includes Suppurative lymphadenitis)	**Either** at least one lymph nodes enlarged to >1.5 cm in size (one adult finger width) **or** a draining sinus over a lymph node. Almost exclusively caused by BCG and then occurring within 2 to 6 months after receipt of BCG vaccine, on the same side as inoculation (mostly axillary).	Heals spontaneously over months and best not to treat. If lesion is sticking to skin or already draining, surgical drainage and local instillation of anti-tuberculosis drug. Systemic treatment with anti-tuberculosis drugs is ineffective	BCG
Osteitis/ Osteomyelitis	Inflammation of the bone with isolation of Mycobacterium bovis BCG strain.	Should be treated with anti-tuberculosis regimens including isoniazid and rifampicin.	BCG
Persistent inconsolable screaming	Inconsolable continuous crying lasting 3 hours or longer accompanied by high-pitched screaming.	Settles within a day or so; analgesics may help.	DPT, Pertussis
Seizures	Occurrence of generalized convulsions that are **not** accompanied by focal neurological signs or symptoms. **Febrile seizures:** if temperature elevated >100.4 ^{0}F or 38 ^{0}C (rectal) **Afebrile seizures:** if temperature is normal	Self-limiting; supportive care; paracetamol and cooling if febrile; rarely anticonvulsants.	All, especially Pertussis, Measles
Sepsis	Acute onset of severe generalized illness due to bacterial infection and confirmed (if possible) by positive blood culture. Needs to be reported as possible indicator of Program error.	Critical to recognize and treat early. Urgent hospitalization for intravenous antibiotics and fluids.	All injectable vaccines
Severe local reaction	Redness and/or swelling centered at the site of injection and one or more of the following: • Swelling beyond the nearest joint • Pain, redness, and swelling of more than 3 days • Requires hospitalization. **Local reactions of lesser intensity occur commonly and are trivial and do not need to be reported.**	Settles spontaneously within a few days to a week. Symptomatic treatment with analgesics. Antibiotics are inappropriate.	All injectable vaccines
Toxic shock syndrome (TSS)	Abrupt onset of fever, vomiting and watery diarrhoea within a few hours of immunization. Often leading to death within 24 to 48 hours. Report as a possible indicator of program error.	Critical to recognize and treat early. Urgent hospitalization for intravenous antibiotics and fluids.	All injectable vaccines

APPENDIX 6.4: RECOGNITION AND TREATMENT OF ANAPHYLAXIS

Anaphylaxis is a very rare (estimated as once every million doses of vaccine given) but severe and potentially fatal allergic reaction. ***When anaphylaxis does occur, the patient must be diagnosed properly, treated and managed urgently by trained staff and transferred to a hospital setting.***

Recognition of anaphylaxis

Anaphylaxis is a severe reaction of rapid onset (usually 5-30 minutes after the injection) characterized by circulatory collapse. The early signs of anaphylaxis are generalized erythema and urticaria with upper and/or lower respiratory tract obstruction. In more severe cases, limpness, pallor, loss of consciousness and hypotension become evident in addition. Vaccinators should be able to recognize the signs and symptoms of anaphylaxis in the box below. In general, the more severe the reaction, the more rapid the onset. Most life-threatening reactions begin within 10 minutes of immunization. ***Keep the vaccinee under observation for at least 20 minutes after the injection.***

Unconsciousness is rarely the sole manifestation of anaphylaxis - it only occurs as a late event in severe cases. A strong central pulse (e.g. carotid) is maintained during a faint, but not in anaphylaxis. Anaphylaxis usually involves multiple body systems. However, symptoms limited to only one body system (e.g., skin itching) can occur, leading to delay in diagnosis. Occasional reports have described reactions where symptoms recur 8 to 12 hours after onset of the original attack and prolonged attacks lasting up to 48 hours.

Clinical Progression	Signs and symptoms of anaphylaxis
Mild, Early Warning Signs	Itching of the skin, rash and swelling around injection site. Dizziness, general feeling of warmth
	Painless swellings in part of the body e.g., face or mouth. Flushed, itching skin, nasal congestion, sneezing, tears.
	Hoarseness, nausea, vomiting
	Swelling in the throat, difficulty breathing, abdominal pain
Late, Life-threatening Symptoms	Wheezing, noisy, difficult breathing, collapse, low blood pressure, irregular weak pulse

Treatment of anaphylaxis

Once the diagnosis is made, **consider the patient as being in a potentially fatal condition, regardless of the severity of the current symptoms.** Begin treatment immediately and, at the same time, make plans to transfer the patient swiftly to hospital (if not already in a hospital setting). Adrenaline (epinephrine) stimulates the heart and reverses the spasm in the lung passages, and reduces edema and urticaria, thus countering the anaphylaxis. But this very potent agent can cause irregular heartbeat, heart failure, severe hypertension, and tissue necrosis if used in inappropriate doses.

Each vaccinator who is trained in the treatment of anaphylaxis should have rapid access to an emergency kit with adrenaline, and be familiar with its dosage and administration. The expiry date of the adrenaline should be written on the outside of the emergency kit and the whole kit should be checked three or four times a year. Adrenaline that has a brown tinge must be discarded.

Steps in initial management

If already unconscious, place the patient in the recovery position and ensure the airway is clear.

Assess heart rate and respiratory rate (if the patient has a strong carotid pulse, he/she is probably not suffering from anaphylaxis).

If appropriate, begin cardiopulmonary resuscitation.

Give 1:1000 adrenaline (see below for correct dose for age or weight) *by deep intramuscular injection* into the opposite limb to that in which the vaccine was given. (Subcutaneous administration is acceptable in mild cases).

And *give an additional half dose around the injection site* (to delay antigen absorption).
If the patient is conscious after the adrenaline is given, place his/her head lower than the feet and keep the patient warm.
Give *oxygen* by face mask, if available.
Call for professional assistance but never leave the patient alone. Call an ambulance (or arrange other means of transport, ***after*** the first injection of adrenaline, or sooner if there are sufficient people available to help you.
If there is no improvement in the patient's condition within 10-20 minutes, of the first injection, *repeat* the dose of adrenaline up to a maximum of three doses in total. Recovery from anaphylactic shock is usually rapid after adrenaline.
Record, or get someone to record, vital signs (pulse rate, respiratory rate and blood pressure), as well as time and exact dose of any medication given. Make sure the details accompany the patient when he is transferred. Mark the immunization card clearly so the individual **never** gets a repeat dose of the offending vaccine. At a suitable moment, explain to parents or relatives the importance of avoiding the vaccine in the future.
Report the occurrence of anaphylaxis to the appropriate officer in the ministry of health by fax or phone when the clinical situation is dealt with.

Adrenaline dosage: 1:1000 adrenaline (epinephrine) at a dose of 0.01ml/kg up to a maximum of 0.5 ml injected intramuscularly (or subcutaneously in very mild cases)

If the weight of the patient is unknown, an approximate guide is:

Less than 2 years	0.0625 ml (1/16th of a ml)
2-5 years	0.125 ml (1/8th of a ml)
6-11 years	0.25 ml (1/4 of a ml)
11+ years	0.5 ml (1/2 of a ml)

UNIT 7

Community Involvement and Communication

LEARNING OBJECTIVES

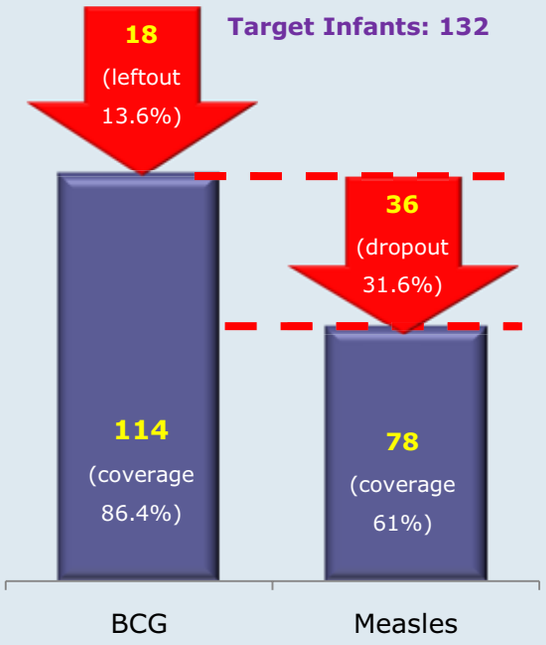
1. To describe the importance of community participation
2. To identify possible roles that the community can play in supporting immunization services.
3. To list the steps in involving the community including
   - Identifying the key stakeholders in the community and where they are located
   - Conducting a situation analysis by exploring reasons for left-outs and dropouts and possible solutions
   - Establishing mechanisms for coordination
   - Developing a communication plan
4. To identify different communication channels and tools for communicating information on immunization.

Community participation or "increasing demand" gives the false impression that lack of motivation for immunization is the reason why children are not getting vaccinated. In reality, mothers are often very willing to have their children vaccinated, if convenient and good quality services are available. Community participation in the immunization program results in higher coverage, reduced left-outs and dropouts and ultimately reduction in the number of cases of VPDs because:

- an informed community has confidence in the immunization program and therefore supports and demands immunization services
- provision of immunization services is tailored to the community's context (time, place and convenience).

You serve many different communities, but are they your partners in the service? Do they have a voice in helping to make sure that immunization services meet their needs?

Who are the Left-outs and Dropouts?



Left-outs are children and women who do not utilize the immunization services for reasons including lack of knowledge, trust in immunization services or geographic and other reasons.

Dropouts are children who receive one or more vaccinations but do not return for subsequent dose.

Since there are varied reasons for left-outs and dropouts, they also require differing interventions (*See Tables 7.1 and 7.2*).

People who "drop out" of the immunization system are the easiest to reach and convince to return for full immunization.

Types of Communities

Communities can be classified as:

- *Geographic* (an urban mass; scattered rural dwellings; temporary homes built alongside railroad tracks.)
- *Religious/ethnic/political*
- *Socio-economic* (caste/class)

Communities are rarely, if ever, homogenous and are usually characterized by wide inequities (e.g. sections of a village or town where the poorest families live). It is important to recognize community differences and dynamics, and to interact with the various sections within the community.

The community's role in supporting immunization

Attempt to involve the community, as much as possible, in each phase of the immunization program- planning, implementation and evaluation.

Planning: HWs should consult communities about service locations and timing to ensure a convenient service (e.g. shifting vaccination hours from mornings to afternoons in areas where mothers are busy in the fields in the morning).

You may not have much time to directly interact with the various community groups and leaders. However, encourage and support HWs and supervisors in establishing strong links with the community.

Implementation: Communities can assist with:

- arranging a clean outreach site (school, club, Panchayat Bhavan, etc.)
- publicizing immunization sessions (e.g. through announcements, messages from community volunteers, flags or banners at health centers or village sites that announce when immunization days are taking place)
- informing community members when the HW arrives at the session site
- registering patients, crowd-control, and making waiting areas more comfortable (by providing shade and organizing space and seating)
- health education — disseminating appropriate messages
- identifying and referring newborns and/or infants who have recently arrived in the community and sharing the list with HW to include in the Immunization register
- motivating fellow community members to use immunization services to bridge cultural or educational gaps between HWs and caregivers. This is particularly important where knowledge of and participation in preventive services is low
- transporting vaccines and HWs
- identifying dropouts and left-outs, making home visits when children are behind schedule, to explain immunization and to motivate caregivers
- communicating with local people and informing HWs about suspected Vaccine-Preventable Diseases (VPDs) and Adverse Events Following Immunization (AEFIs)
- monitoring the immunization program by reviewing the coverage data with the health team

Evaluation: Community leaders can contribute by responding to questions about the quality of services.

Steps for involving the community

Step 1: Identify the key stakeholders in the community and where they are located. These could be:

- Governmental departments and Staff (Health, ICDS, Education, District/ Block Administration, PRI)
- NGOs and local organizations (Nehru Yuva Kendra, National Service Scheme)
- Professional Associations (Indian Medical Association, Indian Association of Pediatrics)
- Community (Parents, Village Health and Sanitation Committee, caste and religious groups, SHGs)
- Private and traditional health practitioners
- Media

Step 2: Conduct a situation analysis

- Identify well performing and poor performing areas in terms of data on vaccination session attendance and local coverage levels
- Assess through meetings, small group discussions or discussions with opinion leaders (*See Appendix 7.1*)
  - community awareness and perceptions about immunization services
  - perceived barriers to immunization (related to quality of immunization services and the community's knowledge, attitudes and practices)
  - issues affecting physical access to services (location, frequency, schedule)
  - access by special groups (minorities, migrants etc.)
- Explore the problems and possible reasons for left-outs and dropouts. Jointly seek possible solutions.
- Assess the current extent of community's involvement with immunization services and discuss possible community support.

Table 7.1: Reasons for Left-outs and Possible Interventions	
Possible Reasons	**Possible Interventions**
All newborns and infants not identified and listed	Involve AWW/ASHA/TBA to identify and share lists of newborns and children with the HWs.
Parents not motivated to immunize children because of their poor understanding of its purpose and importance	Orient community leaders and encourage them to talk to parents about immunization. Train HWs to provide talks and counseling on the importance of immunization. Teach about immunization in health fairs and other events. Use other Communication channels such as local cable television, Wall paintings and posters, Mosque and temple announcements.
Session site too far away (e.g. border populations)	Include all the areas in the microplan. Reorganize the catchment area so that remote sites are visited at least once every two or three months (plan at least 4 immunization sessions a year). Work with neighboring health facilities to coordinate services for border areas. Improve outreach to communities through appropriate transport, additional staff and publicize outreach services.
Refugees/ Families that fear contact with government (e.g. lack proper documents)/ scheduled castes or tribes/ unempowered poor Migrants/Nomadic groups/Homeless families/Urban slums/street children	Determine where these populations reside. Visit the communities and work with local mobilizers/educators and community groups/leaders to discuss reasons why they have never accessed immunization services. Use the opportunity to provide information on the importance of vaccination, the date, time and place of the nearest session. Develop a list of children who have never accessed immunization services in the area.
Sessions too infrequent or timings and days not convenient/ not understood	Plan sessions after consulting the community (e.g. early in the morning/late evening).
Cultural or Religious reasons for refusal of vaccination (myths, rumors and misconceptions)	Find out the reasons for reluctance by talking directly to communities/leaders. Try to address their misconceptions, doubts, and fears by listening to them and offering support. Involve community leaders, particularly the ones favorable to immunization, and other staff working within that particular community in order to encourage their fellow members to have their children immunized. Arrange for an interaction between resistant groups and satisfied beneficiaries in the area to promote immunization.
Financial or gender barriers to immunization (e.g husbands disallow wives to attend sessions because of time/lost labor, expense and/or fear of side effects)	Counsel opinion leaders and influential persons about the danger of VPDs and the benefits of immunization. Encourage peer counseling by fathers of children who accept immunization. Publicize the fact that immunization services are entirely free.

Table 7.2: Reasons for Dropouts and Possible Interventions	
Possible Reasons	**Possible Interventions**
HWs have not clearly explained to parents what vaccines are due, when they are due and why they are needed	Improve talks and counselling by reminding HW /AWW/ASHA to always tell 4 key messages (*See Appendix 7.2*) to mothers using simple language understood by parents. Teach HWs to provide filled in immunization cards to all beneficiaries and to write the next due date on the card. Ask caregivers to repeat the information given to them in order to increase the chance that they will remember when to return. Praise correct answers. Thank the parent for bringing the child. Publicize the immunization schedule.
HWs do not know which children are due and what vaccines are due	Organize tracking of children using immunization registers, counterfoils and tracking bags. Involve community teams (AWW, ASHA, NGOs etc) and share with them the list of dropouts to remind parents about the importance of full immunization and inform them about the date and time of the next session.
HWs have not shown parents respect or conveyed an interest in the child's health (e.g. long waits, HWs shouting at mothers for forgetting the card or bringing the baby in late)	Guide HWs to visit dropouts before the next session to find out the reasons why they missed the session. Sensitize and train HWs, ASHAs and AWWs to communicate with and treat parents with respect, warmth and friendliness. Show concern for the parents' particular situation. Praise and encourage the parents for bringing their children for immunization. Encourage parents to ask questions.
Parents do not return because sessions are not held as planned or vaccines are unavailable	Ensure that each planned immunization session is held despite holidays and in case of HW's leave, by alternate vaccinators. Ensure alternate delivery of vaccines to session sites Encourage community groups to report problems regarding HW's attendance on session days to the PHC. Conduct session monitoring and make real improvements; then publicize the improvements to communities. Ensure adequate supplies of vaccines and logistics.
AEFI in the community discourages parents to immunize their children	Remind HWs to always tell mother/care-givers about common side effects that may occur and what to do should they occur. Investigate the AEFI and apprise community of the details of the case, possible causes and actions taken.
Children and mothers are not immunized when coming to the HWs for curative care (missed opportunities)	When providing other services, always keep an eye out for eligible children visiting the session with a parent or sibling. Ask about their immunization status or refer to the list of due beneficiaries and provide services, as appropriate. Put a reminder about immunization in the facility's waiting area.
HWs do not understand/explain to caregivers that immunization may be given to mildly ill children (false contraindication)	Orient HWs that immunization can be safely provided to mildly ill children and that they should convince parents about this fact.

Step 3: Establish mechanisms for coordination

Establish a consultative mechanism at the block/PHC level or use existing forums such as the Rogi Kalyan Samitis to ensure regular coordination between departments and to enlist community support for immunization services.

- Involve representatives of the key stakeholder groups (*Listed in Step 1*)
- Inform the members well in advance and prepare a clear agenda for the meeting including:
  - State and district immunization goals
  - Current status of immunization in the district and block
  - Key challenges and areas requiring support
  - Possible roles of stakeholders
  - Preparing and implementing a communication plan

If required, re-align Health and ICDS sector boundaries for joint planning, implementation and monitoring of immunization activities.

Step 4: Develop a communication plan

The plan should broadly address the following issues.

- The communication activities in response to specific problems in the immunization program
- The personnel and resources required
- Timeline for implementation
- Monitoring mechanisms.

Based on the prioritization of areas described in *Table 9.4*, prepare a communication plan as outlined in *Table 7.3*.

Table 7.3: Sample Communication Plan

Sub-center	Problem	Reasons	Community involvement activity	Participants	Responsible Person	Resources needed	Time-frame	Monitoring tools
Arthuna Priority 1	55% left-outs (69 of 125 infants)	Session time and place not convenient	Meeting with NGOs and community for joint planning of sessions (times and places)	Community mobilizer, HW, community leaders, NGOs , TBA	PHC Health Extension Educator, Supervisor	Refreshments	Next one month	Minutes of meeting and revised session time and place
Kushalgarh Priority 2	42% dropouts (90 of 212 infants)	Poor tracking	Train HW, AWW and ASHA in identifying and tracking dropouts	HW, AWW, ASHA, Supervisor	MO	Tracking bag, Due list of Beneficiaries	Next monthly meeting	Coverage monitoring chart
Jhalod Priority 3	43% dropouts (66 of 154 infants)	Coincidental AEFI in the village	Community Level Meeting and Street Play on safety of vaccines	AWW, ASHA, HW, NGOs, community leaders	PHC Health Extension Educator, Supervisor, MO	Script for drama, Publicity for meeting	Next two months	Coverage monitoring chart

Channels and tools for communicating information on immunization

The Immunization Program uses many different communication methods to reach parents and other target audiences e.g. radio, television, folk media, community meetings, and interpersonal communication during sessions. At the PHC level, you can effectively use the channels and tools for involving and informing the community about immunization services. (*See Table 7.4*)

Table 7.4: Channels and tools for communicating information on immunization

Communication Channel or Tool	Settings	Objectives
Discussions between HWs and small groups of parents	Immunization sessions	Inform parents (using storyboards or flip charts) about importance of immunization, the immunization schedule and clarify individual concerns
community mobilizers (ASHAs and AWWs)	Immunization sessions, home visits	Identify target beneficiaries and share lists with HWs. Make home visits to mobilize beneficiaries, inform about session dates and times and follow up dropouts.
local leaders such as PRI members, political/religious leaders, teachers, private medical practitioners	Work places or community events	Advocate for increasing immunization coverage and seek their support in mobilizing the community
Community Groups, NGOs, CBOs, SHGs	Work places or community events	Advocate for increasing immunization coverage and seek their support in mobilizing the community
Public/ Street announcements	Town criers, community events	Provide basic information in support of immunization and publicize date and time of session
Drama and Songs	As a precursor to discussion in community meetings	Counter rumors, misconceptions, and other barriers to understanding Provide basic information (e.g. on RI schedule)
Posters, Banners, Tinplates and Wall writing	Well-frequented places such as AWC, markets, bus stops, ration shops, school, Panchayat Bhawan	Display information related to the session site, date, and immunization schedule
Community Self-Monitoring Tools –"My Village is my Home". (*See Appendix 7.3*)	AWC, Panchayat Bhawan, school	Motivate and remind families to get their children immunized.

In most situations, one-to-one, interpersonal communication is best when providing specific information

APPENDIX 7.1: HOLDING AN EFFECTIVE COMMUNITY MEETING

- Hold at a convenient time and place (e.g. on market days or close to places of worship)
- Be prepared with analyzed data on the coverage and dropout rates, a map of the health areas with low coverage
- Identify local community representatives who would participate in the meeting
- Provide a comfortable and welcoming environment for the discussion.
- Listen to the community, find out what the community already knows about vaccine-preventable diseases and immunization
- Provide information, using basic language and non-scientific terminology, on the importance of immunization, the status of the immunization program and where and when services are available. Dispel misinformation and doubts that sometimes surround immunization
- Encourage them to ask questions so that everyone can be better informed.
- Use stories, short plays, songs and visual aids to hold the group's attention and make meetings interesting
- Involve as many group members as possible in the discussion and ask them to suggest solutions to problems
- Help mobilize resources for immunization

APPENDIX 7.2: FOUR KEY MESSAGES FOR CARE GIVERS

...remind parents of 4 key messages

- What vaccine was given and what disease it prevents

- When to come for the next visit

- What are the minor side-effects and how to deal with them

- To keep the immunization card safe and to bring it along for the next visit

! remember: fully immunize each child before its first birthday

APPENDIX 7.3: COMMUNITY SELF-MONITORING TOOL –"MY VILLAGE IS MY HOME"

Village: _____

ANM: _____

AWW: _____

ASHA: _____

MY VILLAGE

MY HOME

Total Population: _____

Annual Infants: _____

Name of Infant (less than 1 yr)	DOB	Birth Wt.	BCG	OPV				DPT			Msl	Vit A '1'
				0	1	2	3	1	2	3		
26.												
25.												
24.												
23.												
22.												
21.												
20.												
19.												
18.												
17.												
16.												
15.												
14.												
13.												
12.												
11.												
10.												
9.												
8.												
7.												
6.												
5.												
4.												
3.												
2.												
1.												
Example: Reena Kumari, d/o Bhim Kumar	*20/1*	*2 kgs*	*1/2*	*1/2*	*21/3*	*18/4*	*16/5*	*21/3*	*18/4*	*16/5*		

Prepare this chart every year with infants and add new live births. Display the chart in the AWC/Panchayat Bhavan/School.

UNIT 8

Supportive Supervision

LEARNING OBJECTIVES

1. To follow the key steps for effective supportive supervision
2. To conduct effective review meetings

Supportive supervision is a process of helping staff to continuously improve their own work performance. It is carried out in a respectful and non-authoritarian way with a focus on using supervisory visits as an opportunity to improve the knowledge and skills of health staff.

This type of supervision encourages open, two-way communication and builds team approaches that facilitate problem-solving. It focuses on monitoring performance towards goals and using data for decision-making. It depends upon regular follow-up with staff to ensure that assigned tasks are being implemented correctly.

Supportive supervision is helping to make things work, rather than checking to see what is wrong.

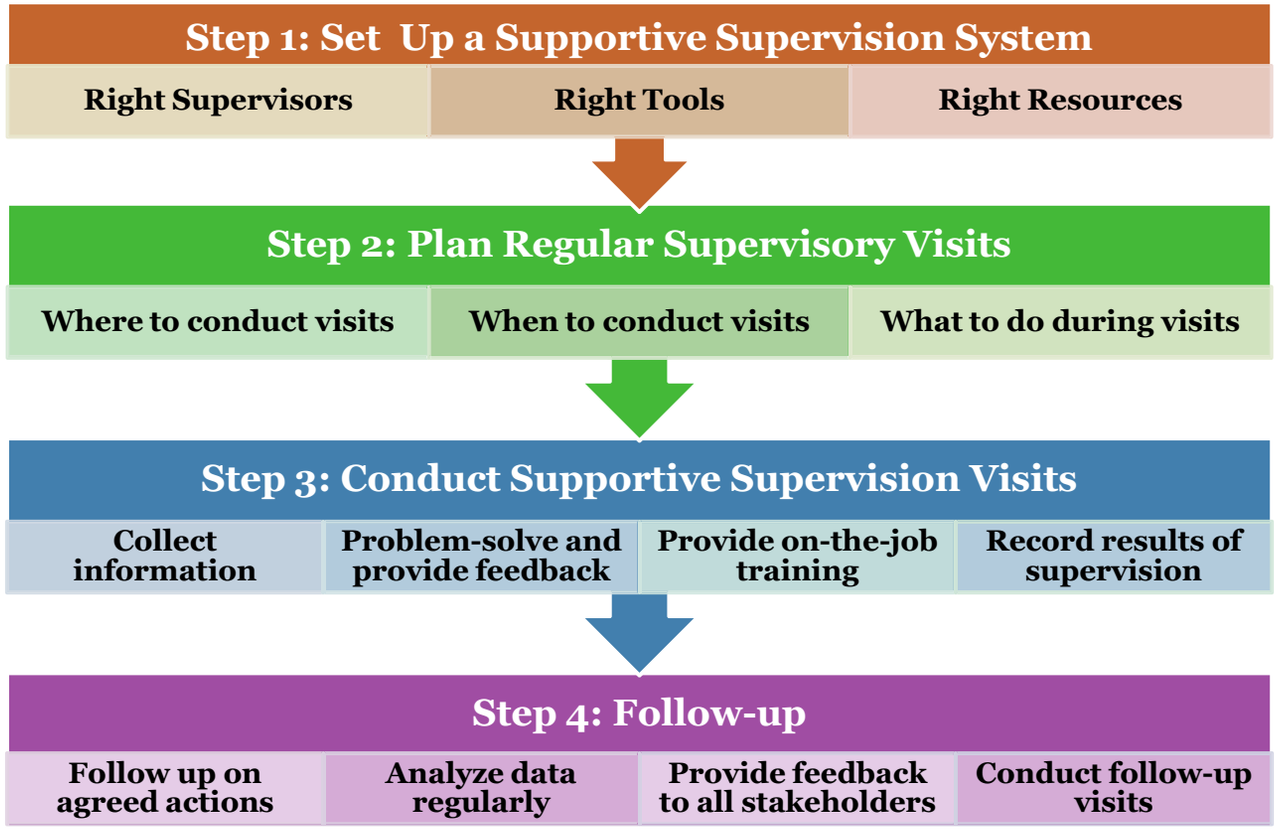
Controlling Supervision versus Supportive Supervision

Traditionally, many supervisors used an authoritarian inspection or control approach to supervision. This approach is based on the thinking that health workers are unmotivated and need strong outside control to perform correctly. However, it has been shown that a supportive approach, where supervisors and health workers work together to problem-solve and improve performance, delivers improved results for the immunization program. *Table 8.1* compares the characteristics of the control approach and the supportive approach.

Table 8.1: Controlling Supervision versus Supportive Supervision

Control approach	Supportive approach
▪ Focus on finding faults with individuals. ▪ Supervisor is like a policeman. ▪ Episodic problem-solving. ▪ Little or no follow-up. ▪ Punitive actions intended. 	▪ Focus on improving performance and building relationships. ▪ More like a teacher, coach, mentor. ▪ Use local data to monitor performance and solve problems. ▪ Follow up regularly. ▪ Support provided. 

Steps for Conducting Supportive Supervision



Step 1: Set Up a Supportive Supervision System

The three main "Rs" for an effective supportive supervision system are as follows.

Right Supervisors: a core set of supervisors, well-trained on supportive supervision techniques and with updated information and skills on immunization issues. As the supervisors will be providing on-the-job training to health workers, it is important that the supervisors are themselves well informed and trained. As an initial step, provide

refresher training for the core supervisors. The training could be on new policies or reporting procedures, changes to the immunization schedule etc or on supportive supervision techniques and participatory approaches.

Right Tools: availability of Supervisory checklists and forms (for recording observations, recommendations and follow up) and training materials and job aids (to update skills of health workers during supervision visits).

Right Resources: sufficient mobility, time allocated for supervision and follow-up.

Step 2: Plan Regular Supportive Supervision Visits

Regular supportive supervision visits are an integral part of the micro-plan and include

Where to conduct visits: Common criteria that can be used for selecting priority areas include:

- high number of unimmunized (in absolute numbers)
- high dropout rates
- low coverage rates
- poor reports from previous supervision visits
- areas with recent outbreaks of measles/AEFI cases; high risk areas for diphtheria, tetanus or measles
- new staff who may need training on immunization practices
- areas with little or no visits in the past
- problems identified by health staff or the community

When to conduct visits: Once you have prioritized areas to be visited over the next quarter/year, prepare a Plan for supervision (*See Table 3.3 in Unit 3*) with at least 4-8 visits planned per month. Consider the following issues:

- Plan visits on immunization session days.
- Supervise both fixed as well as outreach sessions.
- Inform the health worker about the scheduled supervision visit and never go without informing.
- Prepare the supervision plan taking into account the distance, transportation difficulties, or constraints due to weather and travel conditions.
- Schedule enough time to visit the site fully, and if possible provide on-site training; for example it may take two hours or more to meet the needs of a single supportive supervision visit.
- Carry checklists and practical tools/Job aids to provide on site training.

Conduct the visit according to the plan, otherwise inform the health worker in advance. Analyze your planned visits versus held visits and record the reasons for not holding any visit as planned (e.g. lack of transport, competing priorities). The frequency of supervisory visits will vary and poorly-motivated staff, new health centers, new staff or new responsibilities will require more frequent supervision.

What to do during visits: Although certain topics can be planned in advance, interventions may become evident during the visit or during discussions with health workers. Review data of the site, previous supervision reports, filled checklists and data for that PHC/ session site to identify the topics to cover during the visit.

Step 3: Conduct Supportive Supervision Visits

During a supervisory visit to a health facility or a session site, conduct the following main steps.

Collect information: Explain the purpose of your visit and use the supervision checklists (*See Appendices 8.1 and 8.2*) to:

- observe the health-facility environment and the health worker giving vaccination;
- review the adequacy of vaccines & logistics
- review the records
- talk with parents and community members;
- review recommendations from past visits;
- conduct a rapid community survey using the Rapid Immunization Coverage Assessment Tool (*See Appendix 8.3*)

Do not intervene or correct the health worker while she/he is working (unless you feel that the beneficiary will be harmed without your intervention).

Problem-solve and provide feedback:

Describe the problem and its impact

- Focus on the problem and not individuals.
- Tackle one problem at a time.
- Explain the long-term and short-term impact of the problem.
- Be specific in explaining the problem. If possible, back it up with facts, rather than judgment alone.

Discuss the causes of the problem with health staff

- Identify the cause of the problem by asking "why" repeatedly and having open dialogue with the staff. Is it due to lack of skills or to an external factor?
- Do not blame others or blame the system.
- It may sometimes be necessary to seek explanation from other sources (e.g. community members, data, etc.).

Implement solutions and monitor regularly

- Develop, through common consensus, an implementation plan that details what, how, who and when.
- Implement those solutions that can be implemented immediately e.g. training on how to use hub cutter.
- Follow up on progress.

Provide feedback to the health staff concerned

- If you have some bad behavior to comment on, begin with the positive, and be specific about weaknesses, rather than simply saying, "That was not done well".
- Give health workers reasons for their success or failure. Don't just say "Well done". Give a reason saying, "Well done. You correctly read the VVM and took the appropriate action." Don't say "you are wrong" but rather "there may be a problem. The data from your tally sheet do not match the data in the UIP reporting format. How can this be corrected?"

Provide on-the-job training: by following the main steps when teaching a skill:

1. Explain the skill or activity to be learned.
2. Demonstrate the skill or activity using an equipment, model, or role-play.
3. Allow health workers to practice the demonstrated skill or activity.
4. Evaluate the health workers' ability to perform the skill according to the correct procedure and give constructive feedback.

Record results of supervision

After each supervisory visit, prepare a supervisory report with a file copy. This report is vital for planning corrective measures as well as for use in future supervisory visits. The sample Supervisory Visit Report (*Table 8.2*) summarizes the key points from a supervisory visit and meeting.

Table 8.2: Sample Report of Supervisory Visit

Site: *Aajna*	**PHC:** *Garhi*	**Date of visit:** *8.03.08*	**District:** *Banswara*

Summary:
1. Used supportive supervision checklist (attached) for observing an outreach immunization session and for conducting 2 exit interviews with mothers
2. Used Rapid Immunization Coverage Assessment Tool (attached) to interview 10 ST families living on the outskirts to find out immunization status of their children.
3. Discussed and reviewed with health worker and provided on the job training.

Problems identified	Solution(s)	By whom	By date	Completed-Y/N
Wrong injection technique	*Demonstrate correct technique*	*MO*	*8 Mar.*	*Y*
HW does not know how to use the Coverage Monitoring chart	*On-site training on use of chart*	*MO*	*8 Mar.*	*Y*
Vaccine carrier had a crack	*Replace VC*	*MO*	*14 Mar.*	*N*
ST children under-vaccinated due to poor tracking	*Involve ASHA, AWW to identify and mobilize ALL beneficiaries*	*MO and CDPO*	*31 Mar*	*N*
Signature of Supervisor: *Dr Geeta Joshi, MOIC*		Date: *8 March 2008*		

Step 4: Follow-up

Supportive supervision does not end with the conducted visit and you should plan for follow-up, which may include the following:

Follow up on agreed actions by supervisors and supervised staff

Analyze data regularly and establish regular communication with supervised staff to see if recommendations are being implemented.

Review monthly reports and establish regular communication with supervised staff to see if recommendations are being implemented.

Provide feedback to all stakeholders discussing equipment supply and delivery problems with higher levels

Conduct follow-up visits

- Review reports from previous supervision visits and continue to work on the issues raised. Tell health workers what you have learned from the previous visit, in order to avoid repeating the same information
- Observe health workers to see if bad behaviours or attitudes have been corrected and, if it is the case, congratulate them. Check if any perceived lack of improvement is due to hidden problems that need to be addressed.
- Fulfill promises made at the previous visit (i.e. if supplies or other support had been promised).

Conducting Effective Review Meetings

In order to conduct effective review meetings with health workers and staff from other line departments, NGOs and community members, you should**:**

Involve Health and ICDS supervisors, AWWs, local NGOs. The meeting could be chaired by Medical officer or any other Block level officer

- Set clear objectives for the meeting.
- Prepare and circulate an agenda with the list of the topics to be covered; resources required and the time duration.

Do not deviate from the agenda and ensure that set objectives are met. (*See Table 8.3)*

- Assign, to concerned supervisors and colleagues, talks on specific technical topics.
- Assign responsibilities of logistics support to a designated staff member.
- Identify the meeting participants and the chairperson.
- Inform the participants in advance of the venue and date. To avoid cancellation of the meeting due to competing priorities, share in advance the dates of meeting at Block / District level and with other nodal officers. Otherwise, delegate the responsibility of chairing the meeting to another colleague.
- Ensure that the meeting is focused and participatory and not just collection of monthly reports. Keep listening and summarizing the key points raised after intervals.
- Ensure that minutes are taken with actionable points and time-lines.
- Forward unresolved issues to block/district level for necessary actions.
- Share the tentative dates of the next meeting.

Table: 8.3: Sample Agenda for PHC Review Meeting of HWs & ICDS Supervisors

Time	Activities	Facilitators
10:00 - 10:15	Welcome & objectives of the meeting	MOIC
10:15 - 11:15	ANM wise presentation on immunization coverage, dropouts & left-outs using coverage monitoring charts	LHV
11:15 - 11:45	Feedback on supervisory visits & monitoring data	ICC/Health Supervisors/Partners
11:45 - 12:30	Review of immunization register, Sub center reports. Sharing and updating of Health and ICDS Registers	CDPO, MOIC, ICC
12:30 - 13:00	Feedback on ASHA/AWWs/other community mobilizers' involvement for mobilization of beneficiaries	MOIC/CDPO/BDO
13:00 - 13:15	Summary and conclusion	MOIC

APPENDIX 8.1: RI PHC/CHC SUPERVISION CHECKLIST

Name of Block/Planning Unit : _____ Name of CHC/PHC : _____
Date of Visit : ___/___/_____ Population covered : _____ Name of Supervisor: _____

	PROGRAMME MANAGEMENT (Consult Facility in-charge and records)					
1	Components of the Facility's RI Microplan available					
	a. Map of Catchment area (indicating sub-centers and distances from vaccine storage point)					Yes ☐ No ☐
	b. Estimation of Beneficiaries (village/ area wise) for current year					Yes ☐ No ☐
	c. Estimation of Logistics – Vaccines, Syringes, Immunization Cards etc. (village/area wise)					Yes ☐ No ☐
	d. ANM roster / Immunization Calendar					Yes ☐ No ☐
	e. Day-wise Plan for Supervisor field visits					Yes ☐ No ☐
2	ANM Roster / Immunization Calendar displayed at the facility					Yes ☐ No ☐
3	Coverage Monitoring Chart/Drop out Chart (BCG-Measles or DPT 1-3) displayed at the facility					Yes ☐ No ☐
4	Meeting conducted with RI component with Health/ICDS/ PRI in last calendar month *(verify minutes)*					Yes ☐ No ☐
5	Supervisory visits by District level Government Health officials in the last calendar month					Yes ☐ No ☐
	COLD CHAIN (Observe in Cold Chain Room)					
6	***ILRs and DFs***					
	a. Placed on wooden blocks and at least 10 cm away from walls and surrounding equipment					Yes ☐ No ☐
	b. Each equipment is connected through functional Voltage Stabilizer					Yes ☐ No ☐
	c. Functional thermometer placed inside every ILR and DF					Yes ☐ No ☐
	d. No frost OR frost less than 5mm on inside walls of every ILR					Yes ☐ No ☐
7	***Temperature Log Books***					
	a. Twice daily monitoring of temperature in respective log books					Yes ☐ No ☐
	b. Record of power failures/cuts (if any) and Record of Defrosting ILRs & DFs					Yes ☐ No ☐
	c. Periodic checks of Temperature Log Books by Facility in-charge (see evidence of signatures)					Yes ☐ No ☐
8	***Ice Lined Refrigerator (ILRs)***					
	a. Cabinet Temperature between +2 to +8^{O}C					
	b. All vaccine vials correctly arranged inside labeled cartons (expiry date, batch)					Yes ☐ No ☐
	c. No T-series or Hepatitis B vaccine vials placed in the bottom of ILR					Yes ☐ No ☐
	d. Diluents placed in ILR, at least 24 hours before distribution (observe and/or consult)					Yes ☐ No ☐
9	***Deep Freezer (DF)***					
	a. Cabinet Temperature of DFs between -15 to -25^{O}C					Yes ☐ No ☐
	b. Correct placement of ice packs inside DF (in crisscross manner, while freezing)					Yes ☐ No ☐
	c. No RI vaccines stored inside DFs (including reconstituted vaccines)					Yes ☐ No ☐
	SUPPLIES AND STOCKS (Physically count for 1 or 2 vaccines and consult stock register)					
	Vaccines and Diluents	**Actual count**	**Record**		**Actual count**	**Record**
10	BCG/OPV/DPT/DT/TT/HepB/Measles vaccine (in vials)			BCG/Measles Diluent (ampoules)		
11	Records of vaccines and diluents distributed (from vaccine issue register) correlates with Stock Register					Yes ☐ No ☐
12	All sessions conducted in last calendar month issued at least one vial of each antigen					Yes ☐ No ☐
13	Records for ADS and Reconstitution syringes available and updated					Yes ☐ No ☐
	IMMUNIZATION SESSIONS (Consult Microplan, Vaccine Issue Register and MPR)					
14	Imm. Sessions *(for last calendar month)*	**Planned (P)**	**Conducted (C)**	**% conducted (C/P X 100)**	% sessions conducted more than 80%	
					Yes ☐ No ☐ NA ☐	
15	Doses administered *(Cumulative for last 3 months)*	**DPT1 (D1)**	**DPT3 (D3)**	**% Dropout ([D1-D3]/D1 X 100)**	Dropout Rates less than 10%	
					Yes ☐ No ☐	
	REPORTS (Consult MPR in UIP Format)					
16	Any AEFI reported or Zero Report in last 3 calendar months					Yes ☐ No ☐
17	Any VPD reported or Zero Report in last 3 calendar months					Yes ☐ No ☐
	INJECTION SAFETY (Observe)					
18	Immunization waste chemically disinfected					Yes ☐ No ☐
19	Disposal pit used for disposal of disinfected sharps (cut needles, broken vials & ampoules)					Yes ☐ No ☐ NA ☐

APPENDIX 8.2: RI SESSION SITE SUPERVISION CHECKLIST

Name of ANM: _____Name of Subcentre : _____
Name of CHC/PHC : _____ District: _____
Date of Visit : ___/___/_____ Time of visit: _____
Name and designation of Supervisor: _____

1.	Session Site				Sub Center ☐ Anganwadi Center ☐ Other ☐		
2.	Present at Site (tick all that apply) ***If ANM is absent, do not fill this format***				**ANM☐** AWW ☐ ASHA/Link Worker ☐ Mobilizer ☐ Other☐		
3.	Is the session site as per RI micro plan?				Yes ☐ No ☐		
4.	What immunization-related IEC material is displayed at site?(tick all that apply)				Banner☐ Wall writing☐ Tinplate☐ Poster☐ Other ☐		
5.	Is a vaccine carrier with 4 ice packs available?				Yes ☐ No ☐		
6.	What is the condition of icepacks in the vaccine carrier?				Hard Frozen☐ Semi Frozen☐ Fully Melted☐		
7.	Are all vaccine vials & diluents placed in plastic zipper bag in vaccine carrier?				Yes ☐ No ☐		
8.	Availability of vaccines and logistics (Tick)						
	BCG	☐	Measles	☐	DT	☐	Functional hub cutter ☐
	BCG Diluent	☐	Measles Diluent	☐	Vitamin A	☐	Tracking Bag ☐
	tOPV	☐	JE	☐	Blank Immunization Cards	☐	0.1 ml AD Syringes ☐
	DPT	☐	JE Diluent	☐	Red Disposal Bags	☐	0.5 ml AD Syringes ☐
	HepB	☐	TT	☐	Black Disposal Bags	☐	Disposable Syringes ☐
9.	Is any expired vaccine found?				Yes ☐ No ☐ (if yes, which vaccine ……)		
10.	Is any vial of DPT, DT, TT and/or Hepatitis B found frozen?				Yes ☐ No ☐		
11.	Is the VVM on tOPV in usable stage (Stage 1 or 2)?				Yes ☐ No ☐		
12.	Is the time of reconstitution mentioned on both BCG & Measles vial(s)?				Yes ☐ No ☐ NA ☐		
13.	Does ANM/AWW/ASHA/Link Worker have a due list of beneficiaries for this day?				Yes ☐ No ☐		
14.	Is the DPT vaccine administered on outer mid thigh (antero-lateral aspect)?				Yes ☐ No ☐ NA ☐		
15.	Is Vit A being given with a plastic spoon to beneficiaries receiving measles?				Yes ☐ No ☐ NA ☐		
16.	Are all AD and Disposable syringes cut with hub cutter immediately after use?				Yes ☐ No ☐ NA ☐		
17.	Are new immunization cards being filled and issued for all new beneficiaries?				Yes ☐ No ☐ NA ☐		
18.	Are updated counterfoils from previous sessions of this session site available?				Yes ☐ No ☐		
19.	Is the ANM noting each vaccination correctly and completely in the tally sheet?				Yes ☐ No ☐ NA ☐		
20.	Is the ANM giving the 4 key messages to the mother/care-giver?				Yes ☐ No ☐		
21.	Is the vaccine carrier brought by….?(tick only one)				Hired Person☐ Supervisor☐ ANM☐ Other☐		
22.	Is the vaccine carrier distributed from the PHC/Urban Planning Unit today?				Yes ☐ No ☐		
23.	What is the ANM sending back at end of session?(tick all that apply)				Vaccine vials ☐ Used Syringes ☐ Unused syringes ☐ Report ☐		
24.	Has a Supervisor/MO visited sessions in ANM's area in last 1 month?				Yes ☐ No ☐		
25.	What made the mother come here for immunization today? (tick all that apply)			Mother 1	ANM ☐ AWW ☐ ASHA/link worker ☐ Other ☐		
26.				Mother 2	ANM ☐ AWW ☐ ASHA/link worker ☐ Other ☐		

APPENDIX 8.3: RAPID IMMUNIZATION COVERAGE ASSESSMENT TOOL

Interview primary care-giver (e.g mother) in 10 randomly selected households with children under the age of 2 years. If more than one child is present, complete for the youngest.

(Tick all that apply)	SC/ST area ☐ Minority area☐	<1 km from session site☐ >1 km from session site☐	Name of Assessor: ______________________________ Signature:__________________ __________________Date:___________

Name of Child and Name of Father	Age in months	Immunization History (Write Card Date/Y/N/Unknown)										Received ALL vaccines due at that AGE	If child has NOT received ALL vaccines due at that AGE, state reasons (tick all that apply)	
		OPV0	BCG	DPT1	DPT2	DPT3	OPV1	OPV2	OPV3	Measles	Vit A			
												Yes ☐ No ☐	Sick Child ☐ Busy ☐ Not aware of need☐ Afraid of reactions☐	Session too far ☐ HW was rude ☐ Session not held ☐ Other ☐
												Yes ☐ No ☐	Sick Child ☐ Busy ☐ Not aware of need☐ Afraid of reactions☐	Session too far ☐ HW was rude ☐ Session not held ☐ Other ☐
												Yes ☐ No ☐	Sick Child ☐ Busy ☐ Not aware of need☐ Afraid of reactions☐	Session too far ☐ HW was rude ☐ Session not held ☐ Other ☐
												Yes ☐ No ☐	Sick Child ☐ Busy ☐ Not aware of need☐ Afraid of reactions☐	Session too far ☐ HW was rude ☐ Session not held ☐ Other ☐
												Yes ☐ No ☐	Sick Child ☐ Busy ☐ Not aware of need☐ Afraid of reactions☐	Session too far ☐ HW was rude ☐ Session not held ☐ Other ☐
												Yes ☐ No ☐	Sick Child ☐ Busy ☐ Not aware of need☐ Afraid of reactions☐	Session too far ☐ HW was rude ☐ Session not held ☐ Other ☐
												Yes ☐ No ☐	Sick Child ☐ Busy ☐ Not aware of need☐ Afraid of reactions☐	Session too far ☐ HW was rude ☐ Session not held ☐ Other ☐
												Yes ☐ No ☐	Sick Child ☐ Busy ☐ Not aware of need☐ Afraid of reactions☐	Session too far ☐ HW was rude ☐ Session not held ☐ Other ☐
												Yes ☐ No ☐	Sick Child ☐ Busy ☐ Not aware of need☐ Afraid of reactions☐	Session too far ☐ HW was rude ☐ Session not held ☐ Other ☐
												Yes ☐ No ☐	Sick Child ☐ Busy ☐ Not aware of need☐ Afraid of reactions☐	Session too far ☐ HW was rude ☐ Session not held ☐ Other ☐
Conclusion	☐ Adequately vaccinated (0 or 1 child NOT received ALL vaccines due at that AGE) ☐ Under-vaccinated (2 or more children NOT received ALL vaccines due at that AGE)													

UNIT 9

Records, Reports and Using Data for Action

LEARNING OBJECTIVES

1. To list immunization-related recording and reporting formats and describe their use.
2. To identify and solve common issues related to RI records and reports.
3. To explain the use of Routine Immunization Monitoring System (RIMS) and monitoring charts.
4. To analyze routine coverage data to identify problems of access and utilization.
5. To develop an appropriate action plan for the sub-Center and PHC/UHC levels.

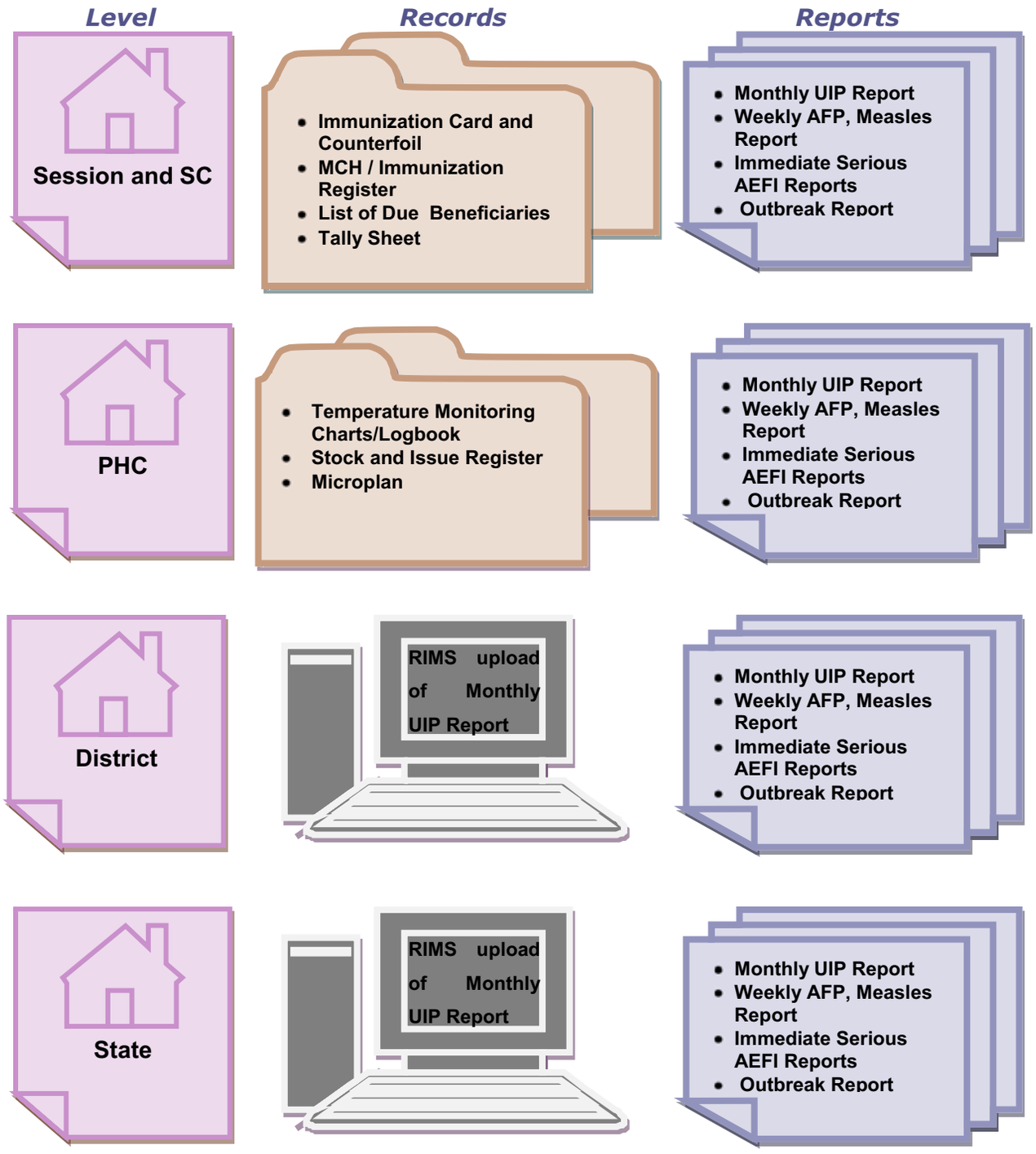
Records focus on collecting details of beneficiaries, vaccination status, visit dates and the number of cases of VPDs and AEFIs. These remain with the individual collecting the information and are usually meant for action at that level.

Reports, on the other hand, are based on records and are submitted to higher levels of program management. Both types of documents provide immunization program managers and health workers with a continuous flow of information that tells them:

- whether RI services are reaching the target population,
- what proportion of the target population is being vaccinated
- who is not being vaccinated
- what is the quality of the services
- are resources being used efficiently and
- is there any reduction in VPDs and AEFIs.

Figure 9.1 shows the records maintained and reports generated at each level of the immunization program.

Figure 9.1: Immunization-related Records and Reports



Records

Immunization Card and Counterfoil *(Figure 9.2)*

Data Collected	Uses
▪ unique identification number ▪ name of mother, father/ husband ▪ date of ANC ▪ expected date of delivery ▪ residential address, ▪ name of PHC/UHC and SC/Clinic ▪ name of Infant ▪ infant's sex ▪ date of birth ▪ date of each vaccination and vitamin A supplementation by dose ▪ TT vaccination provided to the motherz	▪ Enables the health worker to monitor an individual pregnant woman and child's progress towards full immunization. ▪ Reminds the caregiver which vaccines have been given and which vaccines are due ▪ Provides information about vaccination status if the beneficiary is from another area.
Common Problems	**Solutions**
Cells in the immunization card are left incomplete	During supervision visits, check cards to see if all cells are filled correctly and completely
The child's age is entered in the card instead of the date of birth	Train HWs to calculate and note at least the approximate date of birth
The card's serial number does not tally with that of the MCH/ immunization register	Ensure that HWs assign a unique running number such as ECR survey number or ANC number
Often counterfoils are not filled at all or not stored and filed correctly	Train HWs in the correct use of tracking bags for filing counterfoils and tracking dropouts

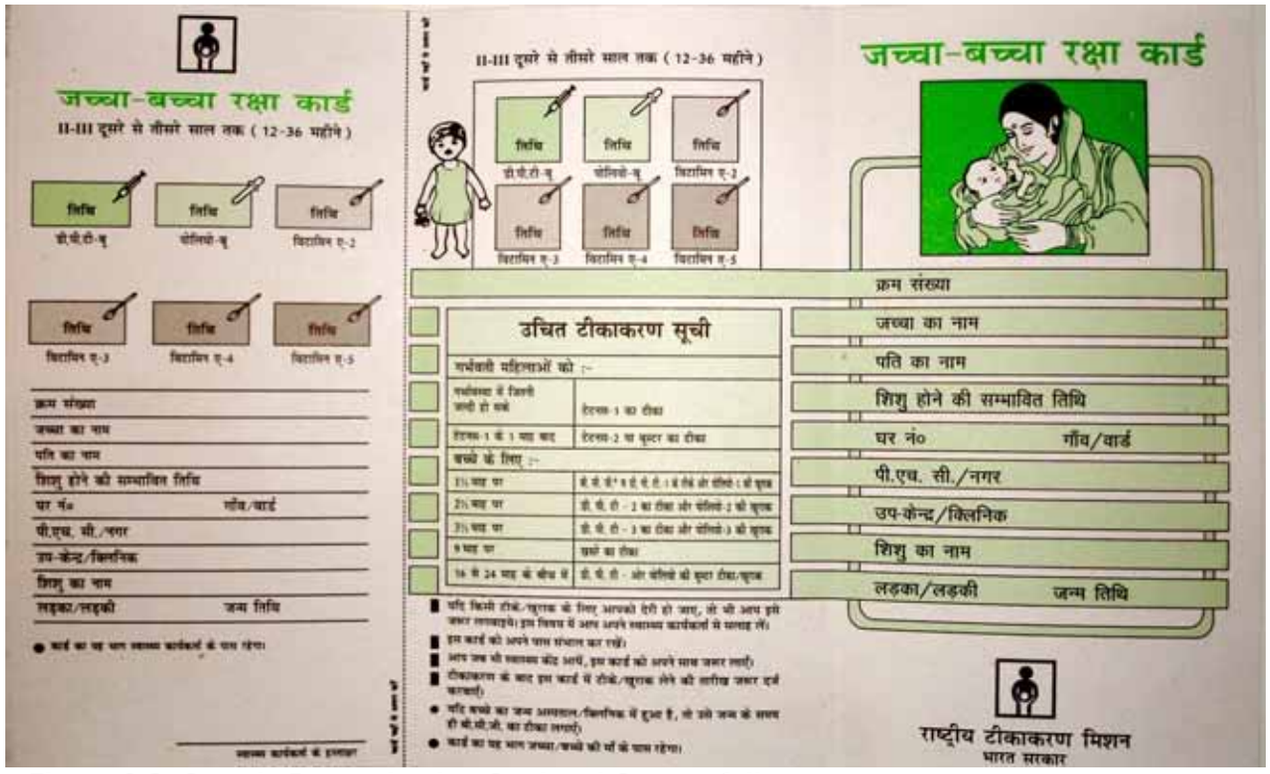
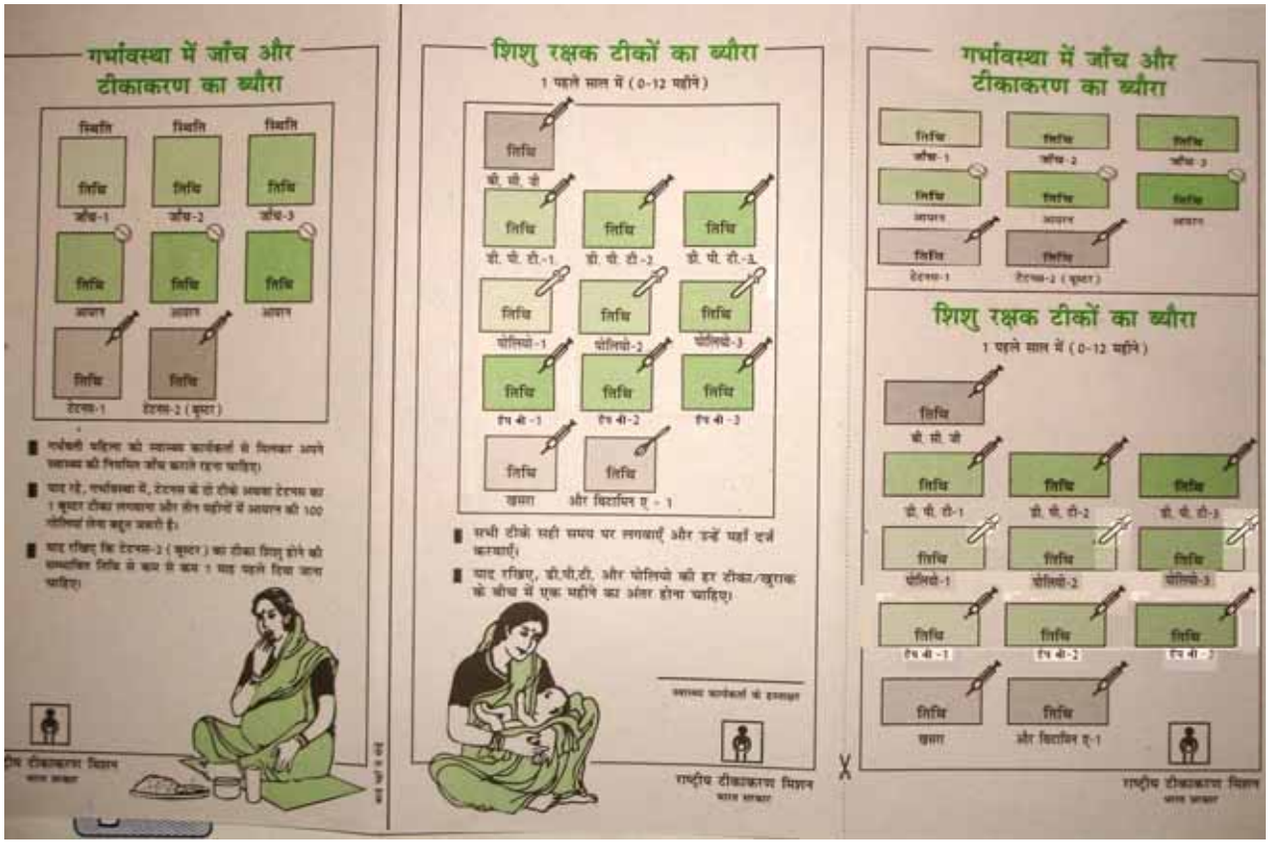


Figure 9.2: Sample Immunization Card and Counterfoil



Tracking Bag

A cloth tracking bag, comprising of fourteen pockets, is a simple, easy- to- use tool for follow up of beneficiaries by filing counterfoils of Immunization cards. It provides the basis for preparing a session-wise name-based list of due beneficiaries for sharing with the AWW /ASHA/Mobilizer and helps estimate the logistics required. Provide one tracking bag for every SC / village / urban area.

The first twelve pockets indicate each of the twelve months of the year. Counterfoils are filed in the pocket indicating the month when the next vaccine is due. For example, if a child receives DPT1 in January, DPT2 is due in February. Therefore, the counterfoil is updated and placed in the pocket for February. When the DPT2 dose is given in February, the counterfoil is updated and moved to the pocket for March, when DPT3 is due. The thirteenth pocket is meant for placing counterfoils of beneficiaries who have left the HW's catchment area or have died. The fourteenth pocket is for filing counterfoils of fully immunized children.

Figure 9.3: Sample Tracking Bag

At the end of each month, cards remaining in the pocket for that month represent dropouts who need to be followed up or moved in the next month's pocket. In the absence of a tracking bag, counterfoils for each month can be tied with rubber bands and labelled.

MCH/Immunization Register *(Table 9.1)*

Data Collected	**Uses**
▪ Name and other details of beneficiary ▪ EDD/ Date of Birth ▪ Vaccines administered and dates of visit	▪ Records doses given to each beneficiary ▪ Helps track beneficiaries who are due for vaccination
Common Problems	**Solutions**
Standard printed registers are often not available and handmade registers of uneven quality are used.	Ensure that printed registers are available in adequate quantities
Data entered is often incomplete	Ensure that registers are filled on the basis of counterfoils after every session and check registers periodically to see if all columns are filled correctly and completely
Even when a beneficiary returns for a subsequent dose, a fresh entry is made, leading to repetition, additional work and confusion.	Guide HWs to allocate different pages of the register to different session sites. This would help the HW to easily locate the data of beneficiaries returning for subsequent vaccinations. Also, train HWs to NOT create a new entry in the register each time the mother returns with the infant for immunization. HWs should ask the mother for the immunization card and look for a corresponding entry in the register. If the immunization card is not available, they should ask the mother the age of her infant and details of the first immunization to locate and update the infant's entry in the register.
The register is not updated to reflect new pregnancies and births found in the AWW's Pregnancy and Birth Register or newborns identified during Polio SIAs.	Advise HWs to periodically update registers before every session to include new pregnancies and births, including those identified during SIAs. Use joint sector-level review meetings of AWWs and HWs to share information about new pregnancies and births in the AWW's area.
The entries do not tally with the AWW's beneficiary register	Ensure that HWs facilitate updating of AWWs' registers after every session

Table 9.1: Sample MCH/Immunization Register

ECR/ANC No	Name of PW	Age	Para/Gravidae	EDD	ANC 1				ANC 2				ANC 3				Delivery			Date of Home Visits			
					TT1/B (date)	IFA (Nos)	Wt (Kgs)	Referral Date	TT1/B (date)	IFA (Nos)	Wt (Kgs)	Referral Date	TT1/B (date)	IFA (Nos)	Wt (Kgs)	Referral Date	Place	If at Home, attendant code	Outcome	1	2	3	Mother's Condition after 6 Wks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Date of Birth	Name of Child	Birth Wt (Kgs)	Sex	BCG (date)	OPV (date)				DPT (date)			HepB (date)			Measles (date)	VitA1 (date)	OPV B (date)	DPT B (date)	VitA (date)								Illness (specify)	If Died	
					0	1	2	3	1	2	3	1	2	3					2	3	4	5	6	7	8	9		Date	Cause
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54

Combined Name-based List of Due Beneficiaries and Tally Sheet *(Table 9.2)*

Data Collected	**Uses**
▪ Names of beneficiaries due for each vaccine for that session ▪ Antigen-wise coverage by gender, age for every session ▪ Vaccines and syringes issued and consumed	▪ Enables the mobilizer to track individual children who are due for vaccination on a particular session day ▪ Copy of the same enables the health worker to document an immunization session by recording every dose of vaccine given ▪ Serves as a basis for monitoring the performance of the health worker and the mobilizer for allowing comparison between the number of beneficiaries actually vaccinated against the expected number of beneficiaries
Common Problems	**Solutions**
The list of due beneficiaries is rarely prepared and shared with mobilizers. Instead, mobilizers rely on chance visits or their memory to mobilize beneficiaries.	Encourage HWs to use counterfoils in tracking bags and MCH register to prepare the list of due beneficiaries, for sharing with the AWW/ ASHA /Mobilizer for mobilizing beneficiaries to the session site.
Beneficiaries who did not attend the session are not identified for follow-up.	Encourage HWs to cross check the list of due beneficiaries with the remaining counterfoils at the end of the session. This helps to evaluate the effectiveness of the mobilization and follow-up of dropouts.
The sheet is not used at all or the same sheet is used for more than one session	Ensure the use of a new tally sheet for each session, whether fixed or outreach
Entries are made before the vaccine is administered, leading to incorrect reporting	Instruct HWs to administer the dose first and then enter data in the tally sheet
Tallies are made based on the number of doses remaining in the used vials at the end of a session rather than on actual number of beneficiaries vaccinated.	Explain to HWs that this method leads to inaccuracies such as inclusion of wasted doses and an over-reporting of actual coverage.
Doses administered to those over 1 year are entered in the less than 1 year age group, leading to inaccurate figures.	Periodically cross-check tally sheets with immunization registers to identify inaccuracies in recording of data.

Table 9.2: Sample Combined Name-based List of Due Beneficiaries and Tally Sheet

Date: 12 March 2008 **Session Site**: Nogama **SC**: Kushalgarh **PHC**: Garhi

Name of Beneficiary	Sex	Age in mths	Name of Father/ Mother	Caste			Vaccines due	Vaccination and Vitamin A doses given																	Remarks*
								TT PW)			BCG	OPV					DPT				Measles	DT	TT		Vit A	
				SC	ST	General		1	2	B		0	1	2	3	B	1	2	3	B			10yr	16yr		
Guddan	M	2	Ram Narayan	✓			DPT1, OPV1																		Left village
Simran	F	10	Mangesh Singh			✓	Measles														✓				
Tahir	M	17	Md. Nizamuddin			✓	DPT /OPV B									✓				✓					
Priyanka	F	4	Kiran Devi			✓	DPT3, OPV3								✓				✓						
Total	Less than 1 yr		Male																						
			Female																						
	More than 1 yr		Male																						
			Female																						

Item	0. 5ml ADS	0. 1ml ADS	5ml Disp. Syringes	BCG Vials	DPT Vials	OPV Vials	HepB Vials	Measles Vials	DT Vials	TT Vials
Received										
Consumed										
Returned										

Name of ANM: Geeta Devi **Signature of ANM:**_____

Name of AWW/ASHA/Mobilizer: Babli **Signature of AWW/ASHA/Mobilizer:**_____

* Write reason why beneficiary is not attending the session (e.g. left village, reluctant, sick, etc.)

Temperature Monitoring Charts *(See Figure 4.7)*

Data Collected	Uses
▪ A daily record of ILR/DF temperature and Powers breaks, if any.	▪ Helps monitor the cold chain
Common Problems	**Solutions**
The charts are not filled regularly and correctly due to: ▪ Absence of individual charts for each ILR/DF ▪ Lack of functional thermometers ▪ Inability to correctly read and record temperatures ▪ Non-recording during weekends and holidays ▪ Hiding instances of out of range temperatures	▪ Ensure that each ILR/DF has a functional thermometer and a separate temperature monitoring chart attached to it. ▪ Train cold chain handlers in the importance of these charts and in correct data entry. ▪ Also emphasize the necessity of recording data regularly, even during weekends and holidays. ▪ Regularly cross check temperatures recorded in the chart with actual temperatures in the ILR/DF.
▪ Temperature ranges in the chart are not analyzed	▪ Regularly check the chart to identify problems and to take corrective action.

Stock Register *(See Appendix 4.4)*

Data Collected	Uses
▪ Opening balance, vaccines received, vaccines issued and used ▪ Dates of receipt and issue ▪ VVM/Freeze Status, expiry dates, batch numbers	▪ Ensures that vaccines are used before their expiry date and that there are no stock-outs, or over-stocking. ▪ In case of a serious AEFI, allows tracking of the vaccine (manufacturer, batch number etc)
Common Problems	**Solutions**
▪ Since the register is not updated regularly it leads to overstocking, shortage of storage space or stock-outs	▪ Ensure that the register is updated for every transaction. Conduct a monthly inventory and accordingly adjust the entries
▪ Entries regarding expiry date, VVM and batch number are often incomplete	▪ Routinely check the stock register for completeness of entries.

REPORTS

Monthly UIP Report *(See Figure 9.4)*

Data Collected	Uses
▪ Target beneficiaries ▪ Sessions planned vs held ▪ Sessions with Alternative Vaccine Delivery ▪ Mobilizers engaged to mobilize children ▪ Sessions with Alternate/private vaccinators ▪ Coverage by sex, age ▪ VPDs and AEFIs ▪ Additional data collected at the PHC includes: Vaccines, logistics and cold chain status	▪ Contains critical data for every level (Sub-center; PHC/CHC/Reporting unit; district and State) on each component of the immunization system.
Common Problems	**Solutions**
Annual targets, either not mentioned or inaccurate	Ensure HWs conduct CNA to arrive at correct estimate of beneficiaries
Columns are left incomplete or are incorrectly filled	Routinely check reports for completeness and accuracy
Since the report is based on data from either the tally sheet or MCH register, it merely aggregates inaccuracies recorded in them. Often the aggregation of data from various tally sheets itself is incorrect.	Routinely validate that data reflected in this report is based on correctly filled tally sheets (ideally) or MCH register. Also ascertain that the aggregation of data from various tally sheets is correct.
VPDs and AEFIs are not reported	Explain to HWs the importance of promptly reporting VPDs and AEFIs and reassure them that no punitive action will result.

Figure 9.4: Monthly PHC UIP Reporting Format

UNIVERSAL IMMUNIZATION PROGRAMME

MONTHLY PHC PERFORMANCE REPORT

P.H.C_____ MONTH_____ 200_____

DISTRICT_____

Yearly Target : Infants_____ **Pregnant women**_____

Number of Sessions : (a) Planned_____ **Actually held**_____

Number of Sessions where vaccines received at site_____ **Number of Volunteers / ASHA engaged to mobilise children**_____

Number of sessions held at Aanganwadi centre:_____ **Number of fully immunized infants**_____

Number of Sessions for which private vaccinators hired	ANM absent	Underserved areas	Urban slums	Total

(A) IMMUNIZATION AND VIT. A.

		Doses	For the Month	Cumulative
PREGNANT WOMEN	TETANUS TOXOID (TT)	1		
		2		
		B		

	Vaccines	Doses	During the month				Cumulative			
			Under 1 year		Over 1 Year		Under 1 year		Over 1 Year	
			Male	Female	Male	Female	Male	Female	Male	Female
CHILDREN	BCG	1								
	OPV	0 dose								
		1								
		2								
		3								
	DPT	1								
		2								
		3								
	Hepatitis B (Where introduced)	1								
		2								
		3								
	MEASLES	1								
	VITAMIN A	1								
	OPV BOOSTER									
	DPT BOOSTER									
	VITAMIN A	2								
		3								
		4								
		5								
	DT (5 YEAR	1								
	TT (10 YEAR)	1								
	TT (16 YEAR)	1								

(B) VACCINE SUPPLY (IN DOSES)

Vaccine	Opening balance	Received during the month	Consumed during the month	Unusable during the month	Balance at the end of the month
DPT					
OPV					
BCG					
MEASLES					
TT					
DT					
VITAMIN A					
HEPATITIS B					

(C) AD SYRINGES SUPPLY

AD Syringes	Opening balance	Received during the month	Consumed during the month	Closing Balance	Disposed as per CPCB norms
0.1 ml					
0.5 ml					
5 ml					

(D) SURVEILLANCE

Disease	For the month		Cumulative since April	
	Cases	Death	Cases	Death
Diphtheria				
Pertussis				
Tetanus Neonatorum				
Tetanus others				
Acute Flaccid Paralysis				
Measles				
CHILDHOOD TUBERCULOSIS				

(E) STATUS OF PHC COLD CHAIN EQUIPMENT

Equiment make	Machine Number	Whether Working	If not, date of breakdown	Date of intimation	Date of Restoration	Remarks

(F) UNTOWARD REACTIONS

		During the month	Cummulative since April
1	Reported deaths associated with Immunisation		
2	Number of abscesses		
3	Other Complications		

Date Medical Officer

To
1. DIO
2. State EPI Officer
3. Assistant Commissionet (Immunization, Room No 106 D, Nirman Bhawan, New Delhi 110011
email-polioindia@yahoo.com ; routineindia@rediffmail.com

Management of Data

Data collected from monthly reports and other sources needs to be consolidated, stored and managed at each level. You need to check both:

Quality of Individual Reports	Quality of the Reporting System
• Accuracy: miscalculation or misplacement of figures • Consistency of data: with what is expected (based on previous experience) • Completeness of all entries	1) Completeness of reporting reports received x 100 reports expected 2) Timeliness of reporting reports received on time x 100 reports expected

Maintain a chart that records timeliness and completeness of monthly reports from PHCs/SCs for tracking purposes (*See Table 9.3*). Late reports should not be rejected or ignored. Instead they can be submitted as an addendum to the monthly report or included in the next monthly report, with an explanatory note specifying the month of the data.

Table 9.3: Timeliness and Completeness of Monthly Reports

District	Dates on which Reports Received (Deadline: 15th of every month)									
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
PHC 1	12	23	12	24	22	22	12	13	26	23
PHC 2	23	15	12	25	20	22	14	14	26	24
PHC 3	24	13	13	25	20	22	16	12	-	-
PHC 4	14	14	13	25	20	24	17	12	25	20
PHC 5	14	20	13	22	13	25	14	12	24	12
PHC 6	12	23	13	22	13	24	13	12	22	12
PHC 7	23	23	13	22	12	23	12	12	22	27
PHC 8	12	23	13	22	-	-	-	14	12	14
PHC 9	13	25	12	22	22	22	23	13	24	15
PHC 10	23	25	-	-	-	22	22	-	-	-
Completeness (%) reports received/ reports expected x 100	100	100	90	90	80	90	90	90	80	80
Timeliness (%) reports received on time/ reports expected x 100	60	30	90	0	30	0	50	90	10	40

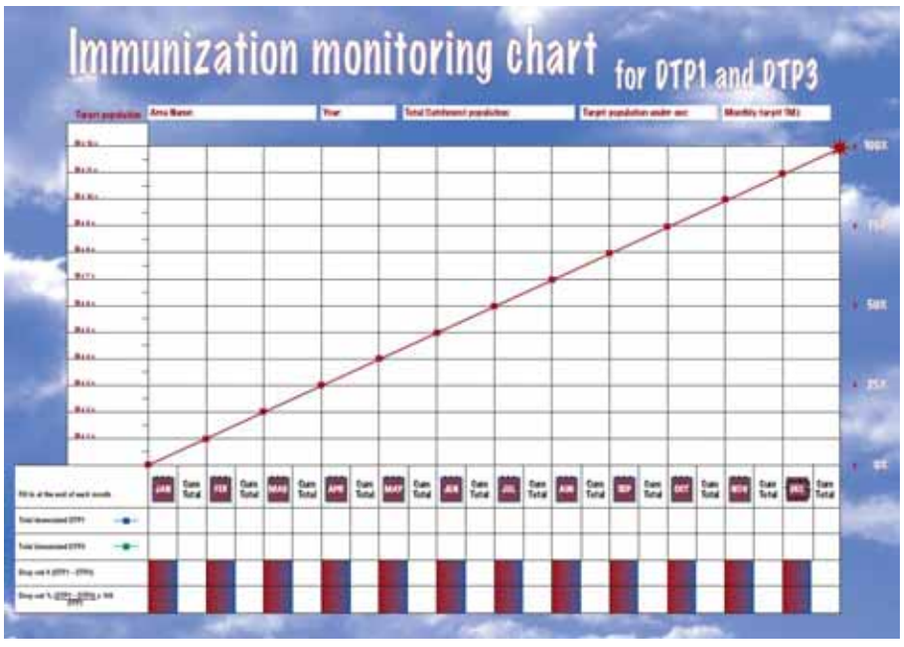
Tools for monitoring data

It is not very important as to 'what data you have.' It is more important as to 'what you do with the data you have' for planning, identifying the deviations from plans and taking corrective actions (monitoring and evaluation). The tools described below help in using the data efficiently and effectively.

Coverage Monitoring chart

This chart has been developed to track the coverage of infants on a month-by-month basis against the target population (left-outs). It also helps to determine whether the beneficiaries are completing the series of vaccines (dropouts). Ensure that the chart is prepared for each level (sub-center upwards), using the data for that particular level. Moreover, each chart should be displayed and updated regularly.

Figure 9.5: Coverage Monitoring Chart



How to prepare a coverage/dropout monitoring chart

The following steps will help you prepare a chart for monitoring the number of doses administered and dropouts in infants less than one year of age.

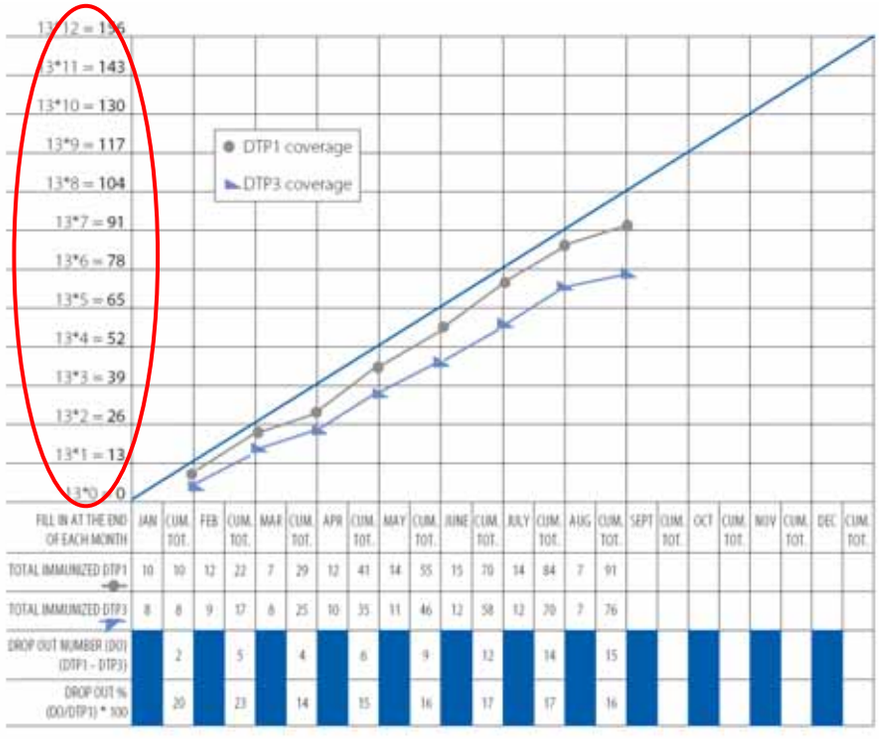
Step 1: Write down the annual target population to receive immunization services of infants less than one year of age.

The annual target population is based on the annual/biannual headcount of the total number of infants in the catchment area (SC/PHC/CHC etc).

Step 2: Calculate the monthly target population of infants. To calculate the number of children who should be vaccinated each month (i.e. the monthly target population), divide the annual target population by 12.

For example: If the annual target under one year is 156, the monthly target is 156/12 = 13. That means each month 13 infants should be vaccinated: 13 in April, another 13 in May, another 13 in June, etc.

Step 3: Label the chart. Always ensure that the chart has a title, usually written across the very top so that it does not obscure the chart.

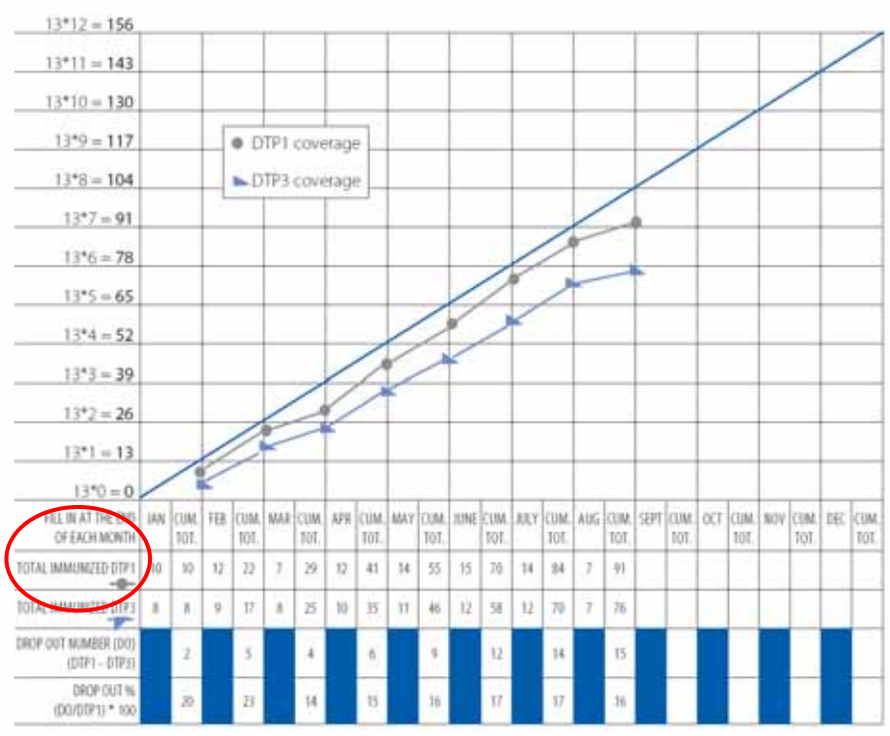


For example: DPT1 and DPT3 doses administered and dropouts in infants less than one year of age – Kushalgarh SC – 2008

Label the left side (Y axis) of the chart with the 'cumulative' monthly target, i.e. the increasing number of children that are targeted each month.

For example: If the monthly target is 13, the cumulative target for April will be 13; for May it will be 26 (13 + 13); for June it will be 39 (13 + 13 + 13); for July it will be 52 (13 + 13 + 13+ 13), etc.

Step 4: Label the boxes at the bottom with the name of the vaccine and dose that you are monitoring, e.g. DPT1 and DPT3, or BCG and Measles.



Step 5: Draw a diagonal line from zero to the top right-hand corner to show the ideal coverage rate if every targeted infant is immunized on time.

Step 6: Plot the immunization data on the chart. Locate the row of boxes underneath the graph. Locate the spaces for the month you are recording. Enter the monthly total of DPT1 doses given.

a) Add the current month's total doses to the previous cumulative total to calculate the current cumulative total, and enter it on the right side of the month column you are recording.

b) Make a dot on the graph for the cumulative total recorded on the right side of the month column you are recording.

c) Connect the new dot to the previous month's dot with a straight line.

d) Repeat Steps a to c every month until the end of the year.

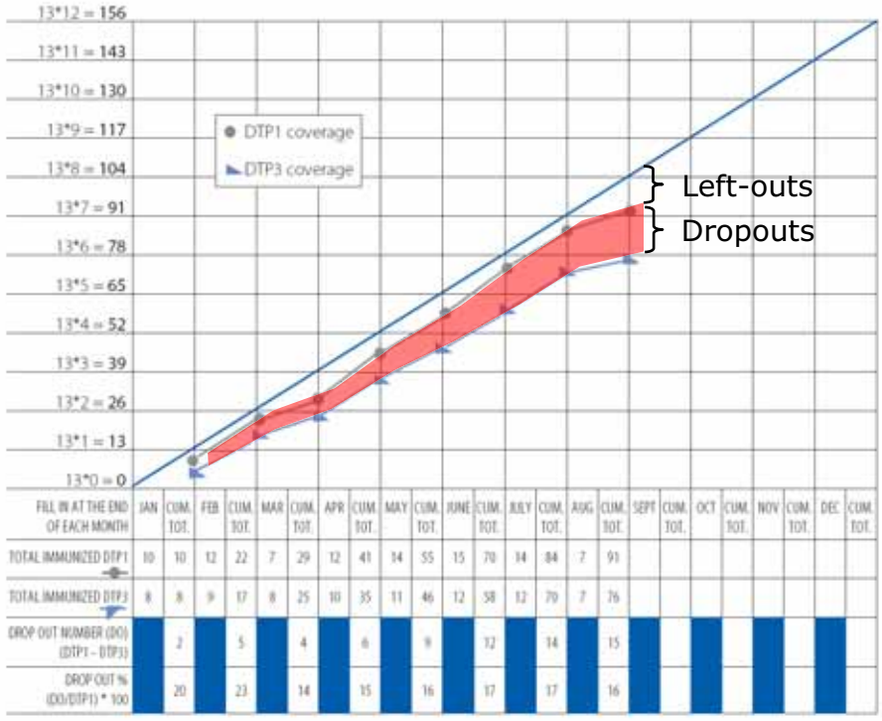
e) Plot DPT3 immunizations given in the same way as DPT1 (follow steps a to d).

Step 7: Calculate the total number of dropouts between DPT1 and DPT3 by subtracting the cumulative total for DPT3 from the cumulative total for DPT1.

Step 8: Calculate the cumulative dropout rate as follows:

Dropout Rate = DPT1 cumulative total minus DPT3 cumulative total x 100
DPT1 cumulative total

The left-outs for DPT1 can be visually monitored: it is the gap between the diagonal target line and the DPT1 line. Similarly, the dropouts can be seen: it is the gap (shaded pink) between the line of DPT1 and of DPT3.



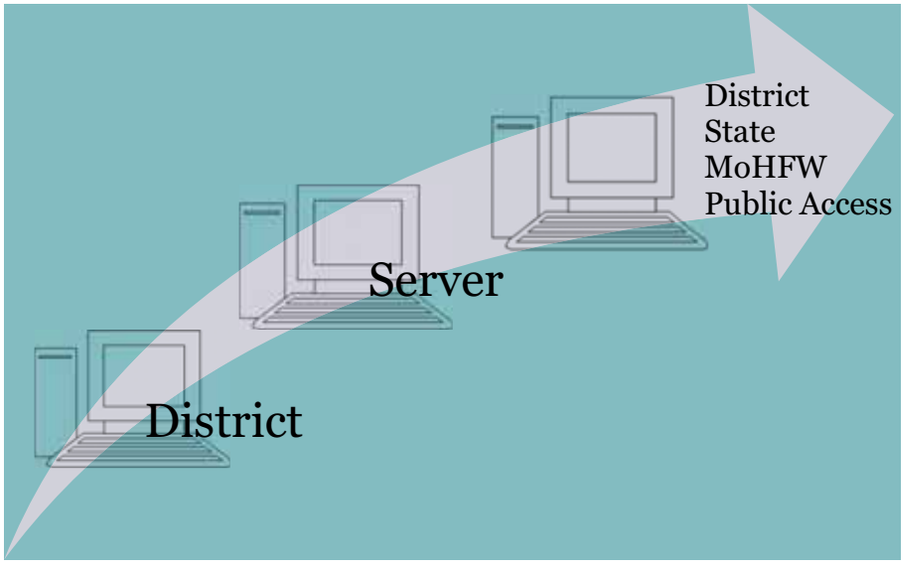
Routine Immunization Monitoring System (RIMS)

Late, incomplete and intermittent information about RI program inputs and performance hampers comparison across time and place and leads to poorly informed decision-making and implementation. Moreover, for a vast country like India, with reports received from a range of units, paper-based reports render the tasks of submission and analysis very difficult.

RIMS is a computer-based monitoring system that facilitates the regular and timely entry of immunization data from the PHC/block level to districts, states and at the national level and for generating analytical reports.

Therefore, GoI implemented the Routine Immunization Monitoring System (RIMS) a computer-based monitoring system that facilitates the regular and timely entry of immunization data from the PHC/block level to districts, states and at the national level and for generating analytical reports. The software has both offline and online components. RI data from monthly UIP reports from the district's reporting units is entered into the software at the district level by a designated computer assistant in the DIO's office. Additional information relevant at the district level

(finance, etc) is also entered. Furthermore, data is entered at the state level by the computer assistant handling RI data. If entered offline, data is uploaded later to the national server at ***www.rimsindia.org***. As this is an intranet system, unique user ids and passwords are required for all users. This data can be reviewed by immunization managers at district, state and national levels and various useful reports (graphs and maps) can be generated for taking corrective action. Data Flow in RIMS is as follows:



This data can be reviewed by immunization managers at district, state and national levels and various useful reports (graphs and maps) can be generated for taking corrective action.

Steps in Using Routine Data for Action

Step 1: Compile population and coverage data of the last full financial year (*See Table 9.4*).

- List each SC, village or urban area covered (column a).
- List the headcount-based infant population (column b).
- Enter the number of doses of vaccine administered to the target age group during the last full financial year for DPT1 and DPT3 (columns c and d)[17].

[17] Coverage rates for estimating left-outs and dropouts can be calculated using various antigens. In this example, we have used DPT1 and DTP3. BCG and Measles can also be used similarly.

Table 9.4: Using Routine Data for Action

Step:1 Compile population and immunization coverage data of last financial year				**Step 2: Calculate coverage**		**Step 3: Analyze problem**		**Step 4:Identify Problem**		**Step 5: Prioritize area**
a	b	c	d	e	f	g	h	i	j	k
SC Name	Infant population	DPT1 Doses administered	DPT3 Doses administered	DPT1 Coverage (%)	DPT3 Coverage (%)	Unimmunized with DPT3 (No.)	DPT1 – DPT3 Drop- out rates (%)	Access	Utilization	Priority (1,2,3..)
Kushalgarh	200	212	122	106%	61%	78	42%	Good	Poor	2
Talwara	133	125	89	94%	67%	44	29%	Good	Poor	4
Arthuna	125	56	26	45%	21%	99	53%	Poor	Poor	1
Jhalod	138	154	88	112%	64%	50	43%	Good	Poor	3
Partapur	46	36	26	78%	56%	20	28%	Poor	Poor	5

Step 2: Calculate Immunization coverage of DPT1 and DPT3 (in columns e and f) using the following formula:

DPT1/ DPT3 coverage =

Doses of DPT1/DPT3 administered (column c/d) x 100
Target population < 1 year (column b)

Note: Kushalgarh SC and Jhalod SC have a higher number of children immunized with DPT1 than the infant population, possibly because of:

- incorrect estimation of the infant population
- including children older than 1 year of age in the infants vaccinated
- including children from other areas

The same reasons could also apply for negative DPT1-DPT3 dropout rates.

Step 3: Analyze the Problem. Calculate the number of infants unimmunized with DPT3 vaccine (in column g), using the following formula:

Unimmunized with DPT3 vaccine =

target population < 1 year (column b)*minus* DPT3 doses administered (column d)

Calculate (in column h) the annual dropout rate for DPT1–DPT3 using the following formula:

Annual dropout rate for DPT1–DPT3=

Doses of DPT1 administered (column c) *minus* doses of DPT3 administered (column d) x 100
Doses of DPT1 administered (column c)

Step 4: Identify the problem (access or utilization?)

for each SC area using *Table 9.5*.

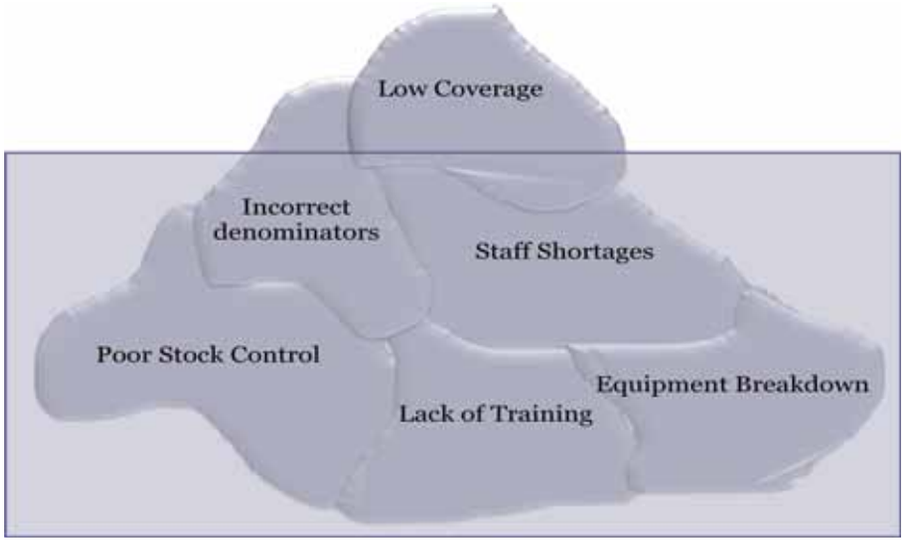
Table 9.5: Access or Utilization Problem

Coverage (DPT1)	**Dropout Rates (DPT1-DPT3)**	
	Low (≤10%)	**High (>10%)**
High (≥80%)	Good access Good utilization	Good access Poor utilization
Low (<80%)	Poor access Good utilization	Poor access Poor utilization

Specify (in column i) the quality of access (good or poor) depending on the DPT1 coverage of 80% or more (good) or <80% (poor)

Specify (in column j) the quality of "utilization" (good or poor) depending on the DPT1-DPT3 dropout rates of 10% or less (good) or more than 10% (poor).

Any single problem identified through data review may just be a symptom of many underlying problems in the immunization system.

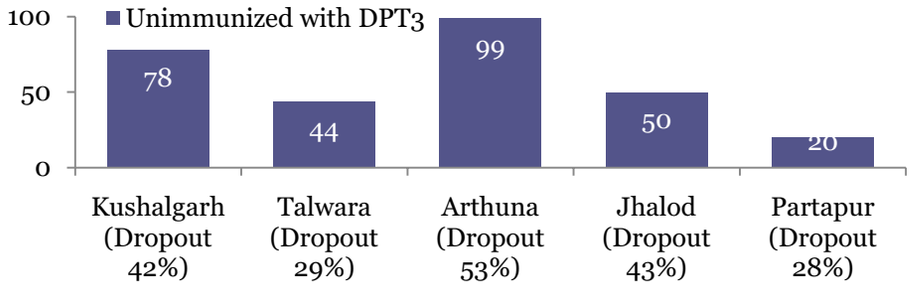


Step 5: Prioritize areas

Assign each SC with a distinct priority i.e. there should be no SC with the same priority. Give higher priority to areas with the larger absolute number of unimmunized infants, and not necessarily the higher dropout rates. As we can see in *Figure 9.6*, Arthuna SC which has the highest dropout rates (53%) and also the highest number of unimmunized infants with DPT3, naturally receives the highest priority i.e. priority 1. However, although Kushalgarh SC and Jhalod SC both have almost equally high dropout rates, Kushalgarh SC gets higher priority because it has a much larger number of infants unimmunized with DPT3 (78) as against Jhalod SC (50).

Other factors that can be considered are areas which have experienced VPD outbreaks and other high risk areas, etc.

Figure 9.6: Prioritization of Areas



Step 6: Decide on the actions needed and when to respond to a problem. The speed at which you respond to a problem depends on the potential impact that problem will have on the immunization program. In general these can be categorized into three levels of priority.

- Immediate problems that may cause interruption to the immunization service or risk health and/or lives (urgent).
- Trends that threaten the failure of the immunization program (medium-term).
- General improvements required in the performance and quality of the immunization program (long-term).

Table 9.6: Priority Problem and Speed of Response

	Urgent	Medium term	Long term
Purpose	Solve immediate problems that may cause interruption of RI services or risk health	Reverse trends that threaten the failure of the RI program.	Improve the performance and quality of RI services
Solved within	Next few days/weeks.	Next few months.	Next planning cycle: (quarterly or annually)
Examples	Stock out or confirmed report of polio case.	Reduced coverage or increased dropout.	Improving the number of reports of AEFIs

Table 9.6 shows how each priority level will affect the speed at which the problems should be resolved

Sometimes an urgent problem may also need some medium and long-term action. For example: If a cold chain failure

due to breakdown of the ILR has been identified, the urgent response will be to ensure that vaccines are transferred to a cold box or to an alternative cold storage point to avoid an interruption to the immunization program. A medium-term action might be to arrange for repairs of the ILR. A long-term action might be to indent for a new ILR if the ILR is beyond repair.

Step 7: Formulate action plan as a simple way to track the decisions you have made and the people responsible for implementing the solutions. Once complete, an action plan, becomes part of the monitoring process, and must be reviewed regularly to ensure that progress is being made. Identify and list the main causes of problems associated with high dropouts and poor access in each SC under the categories of supply, staffing and service delivery and demand.

For each category, list the causes associated with quality and quantity separately. The action plan also assigns responsibilities and completion dates. See *Table 9.7* for a sample action plan to increase immunization coverage in Arthuna SC (priority 1) which has problems of both access and utilization.

Table 9.7: Action Plan for Increasing Immunization Coverage in Arthuna SC						
Component	**Causes of access and utilization problems**	**Solutions With existing resources**	**Solutions With extra resources**	**Person(s) responsible**	**Date for completion**	**Completed (Yes/No)**
Supply Quality	Hub cutter not functioning		Inform DIO for replacement of hub-cutters	Stock in-charge, MO	Immediately	Yes
Supply Quantity	No buffer stock of AD syringes	Better local forecasting and timely indenting		Stock in-charge, MO	By the end of the month	Yes
Staffing Quality	ANM has poor injection practice resulting in 2 abscesses. Received no supervisory visit last year from LHV/MO/HA(M)	Use monthly meetings to provide hands on training to improve injection techniques of ANMs Plan and conduct regular visits by LHV and MO		LHV, MO	During next meeting Next week	Yes Yes
Staffing Quantity						
Service Quality and Demand	Rumors or myths against vaccination ASHAs/ mobilizers not being used effectively	Conduct advocacy visits with local leaders and meetings to promote RI Share list of due beneficiaries with ASHA/mobilizer		MO, Block Extension Educator/Health Educator ANM	Within two weeks Immediately	Yes Yes
Service Quantity and Demand	Outreach sessions not held during the monsoon floods	List flood affected villages as hard to reach areas in the microplan	Request additional mobility support for conducting sessions in flood affected villages	LHV, MO	By the end of the month	Yes

Feedback refers to the process of routinely sending analysis and reports to the peripheral levels of the reporting system (SC). Monthly feedback of results, regardless of what the analysis shows, creates a collaborative environment by acknowledging the hard work of data providers (health workers) and making them aware that their data is used. Feedback can improve the accuracy and promptness of the reports and raise the morale of the staff. Feedback can be provided through:

- Supervisory visits to health centers
- Periodic meetings
- Telephone calls
- Letters or memoranda
- Any other time you meet staff from peripheral levels

Content of feedback includes:

- Comments on the timeliness of reports
- Information on the total number of cases of each disease
- Comparisons of data from different sub-centers/ PHCs
- Information on actions taken
- Congratulations on doing a good job or encouragement to do a better job

Feed-forward is the reverse of feedback. It is the process of forwarding surveillance and other monitoring data to higher levels. The content of feed forward includes:

- the number of VPD cases and other data from different components of the RI program
- the analysis of why a trend occurred
- a summary of the actions that have been taken or that are recommended (such as an outbreak investigation or an increase in the supply of AD syringes)

a copy of all completed case investigation forms (e.g. for measles, neonatal tetanus or AEFI).

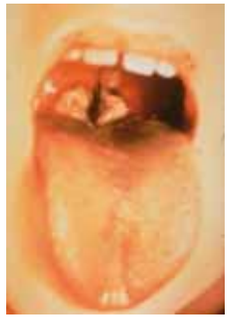
UNIT 10

Vaccine Preventable Diseases and VPD Surveillance

LEARNING OBJECTIVES

1. To list the various Vaccine Preventable Diseases (VPDs), their standard case definitions (suspect, probable and confirmed), treatment and preventive measures
2. To define surveillance and list its uses
3. To explain steps in conducting surveillance
4. To effectively investigate a VPD outbreak

DIPHTHERIA



1. Standard Case Definition

Suspect (history)

- Sore throat, mild fever, grayish white membrane in throat
- Exposure to a suspect case of diphtheria in the previous one week or a diphtheria epidemic in the area

Probable (history and clinical examination)

- An illness characterized by laryngitis or pharyngitis or tonsillitis and an adherent membrane of the tonsils, pharynx and/or nose.

Confirmed (laboratory tests)

- Probable case that is lab-confirmed or linked epidemiologically to a lab-confirmed case i.e. Isolation of the corynebacterium diphtheria from throat swab or four fold or greater rise in serum antibody titre (only if both serum samples are obtained before administration of diphtheria toxoid or antitoxin).

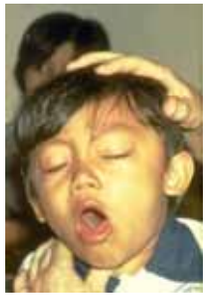
2. Treatment

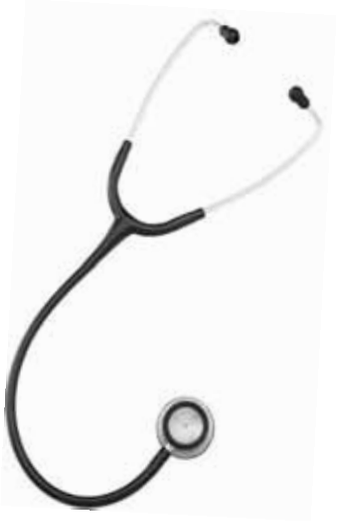
- Diphtheria antitoxin and antibiotics (erythromycin or penicillin) for suspects and cases.
- Cases are isolated and contacts are vaccinated with diphtheria toxoid to prevent additional cases.

3. Prevention

- Immunization of children with DPT vaccine as per the NIS.

PERTUSSIS (WHOOPING COUGH)





1. Standard Case Definition

Suspect (history)

- Cough persisting for 2 weeks or more
- Fits of coughing which may be followed by vomiting.
- Typical whoop in older infants and children
- Exposure to a suspect case in the previous 2 weeks or an epidemic of whooping cough in the area

Probable (history and clinical examination)

- A case diagnosed as Pertussis by a physician or a person with cough lasting at least 2 weeks with at least one of the following symptoms:
  - Paroxysms (i.e. fits) of coughing
  - Inspiratory whooping
  - Post-tussive vomiting (i.e. vomiting immediately after coughing) without other apparent cause

Confirmed (laboratory tests)

- Isolation of Bordetella pertussis or detection of genomic sequences by means of the polymerase chain reaction (PCR) or Positive paired serology

2. Treatment

- Antibiotics, usually erythromycin to shorten the period of communicability.
- Children infected with Pertussis should receive plenty of fluids to prevent dehydration.

3. Prevention

- Immunization of children with DPT vaccine as per the NIS.

NEONATAL TETANUS

1. Standard Case Definition

Suspect (history)

- Any neonatal death between 3 and 28 days of age in which the cause of death is unknown, or any neonate reported as having suffered from Neonatal Tetanus (NT) between 3 and 28 days of age and not investigated

Probable (history and clinical examination)

- Any neonate with normal ability to suck and cry during the first 2 days of life and who, between 3 and 28 days of age, cannot suck normally and becomes stiff or has spasms

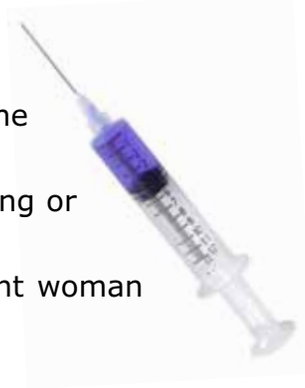
Confirmed (laboratory tests)

- The basis for case classification is entirely clinical and does not depend upon laboratory confirmation. NT cases reported by physicians are considered to be confirmed

2. Treatment

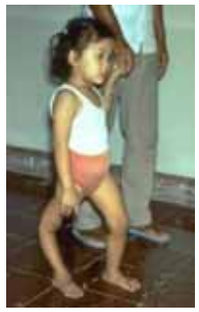
- Excellent 24-hour-a-day nursing care in a referral hospital, with careful use of drugs can reduce the case fatality rate in neonatal tetanus from 80% to 50% or lower.
- Individuals who recover from tetanus do not have natural immunity and can be infected again and therefore need to be immunized.

3. Prevention



- Immunization of infants and children with DPT/DT/ TT vaccine according to the NIS.
- Immunization of women of childbearing age with TT, either during or outside of pregnancy.
- Clean practices during and after child birth, even if the pregnant woman has been immunized.

POLIOMYELITIS



1. Standard Case Definition

Suspect (history)

- Sudden onset of weakness and floppiness in any part of the body in a child less than 15 yrs of age or paralysis in a person of any age in whom polio is suspected.

Probable (history and clinical examination)

- Epidemiologically linked case.

Confirmed (laboratory tests)

- Isolation of wild polio virus from stool.

2. Treatment

- In acute stage, complete bed rest with proper positioning of the affected limb. Avoidance of massage and injection.
- Physiotherapy after the acute phase subsides.
- Orthopedic surgery for deformities/contractures.

3. Prevention

- Immunization with OPV as per NIS. OPV is recommended for both routine immunization and Supplementary Immunization Activities (SIAs) for children up to 5 years of age.

MEASLES

1. Standard Case Definition

Suspect (history)

- Any case with fever and rash

Probable (history and clinical examination)

- Fever AND maculopapular rash (i.e. non-vesicular or without fluid) lasting for more than 3 days AND {Cough OR coryza (running nose) OR conjunctivitis (red eyes)}

Confirmed (laboratory tests)

- At least a fourfold increase in antibody titer, or isolation of measles virus, or presence of measles-specific IgM antibodies in blood OR case is linked epidemiologically to a laboratory confirmed case

2. Treatment

- Supportive care with frequent food and fluid intake. Antibiotics for complications as pneumonia/diarrhoea
- 2 doses of vitamin-A given 24 hours apart @ of 50000 IU for <6 months; 1 lakh IU for 6-11 months and 2 lakh IU for 12 months and above age group.

3. Prevention

- Measles vaccination as per the NIS.

TUBERCULOSIS (CHILDHOOD)

1. Standard Case Definition

Suspect (history)

- A child with fever and / or cough for more than 3 weeks, with or without weight loss or no weight gain; and history of contact with a suspected or diagnosed case of active TB disease within the last 2 years

Probable (history and clinical examination)

- A combination of clinical presentation, sputum examination wherever possible, chest X ray, Mantoux test and history of contact

Confirmed (laboratory tests)

- A patient with culture positive for the Mycobacterium Tuberculosis or a patient with two sputum smears positive for acid-fast bacilli.

2. Treatment

- Directly Observed Treatment Short course (DOTS) under RNTCP (Revised National Tuberculosis Control Program)

3. Prevention

- Immunization of infants with BCG as per the NIS can protect against childhood forms of TB such as tubercular meningitis and miliary TB.

HEPATITIS B

1. Standard Case Definition

Suspect (history)

- An acute illness typically including acute jaundice, dark urine, anorexia, malaise, extreme fatigue and right upper quadrant tenderness. Biological signs include increased urine urobilinogen and >2.5 times the upper limit of serum alanine aminotransferase.

Probable (history and clinical examination)

- Not applicable

Confirmed (laboratory tests)

- Serum positive for IgM anti-HBc or less desirably, hepatitis B surface antigen (HBsAg)

2. Treatment

- Supportive treatment is indicated for acute condition.
- In chronic infection, medicines can limit the disease

3. Prevention

- 3 doses of Hepatitis B vaccine are recommended during the first year of life. They are given at the same time as the three doses of DPT as per the NIS

JAPANESE ENCEPHALITIS

1. Standard Case Definition

Suspect (history)

- A person of any age, at any time of the year with acute onset of fever and a change in mental status (including symptoms such as confusion, disorientation, coma or inability to talk) AND/OR new onset of seizures (excluding simple febrile seizures). Other early clinical findings may include an increase in irritability, somnolence or abnormal behavior greater than seen with usual febrile illness.

Probable (history and clinical examination)

- A suspect case that occurs in close geographical and temporal relationship to a laboratory confirmed case of JE, in the context of an outbreak

Confirmed (laboratory tests)

- Presence of JE virus specific IgM antibodies in a sample of serum and/or cerebrospinal fluid (CSF) as detected by an IgM-capture ELISA.

2. Treatment

- There is no specific treatment for Japanese encephalitis. Antibiotics are not effective against the JE virus. Supportive treatment is indicated.

3. Prevention

- Following the campaigns targeting all children in the age group of 1-15 years in the high risk districts, the vaccine is integrated into the UIP of the district. Children between 1-2 years are targeted for one dose of JE.

Surveillance of Vaccine Preventable Diseases

Each individual case of VPD needs to be recorded and reported upwards within a comprehensive VPD surveillance system. The following section provides an overview of the components of VPD surveillance.

Definition of Surveillance

Surveillance is data collection for action. It is defined as the ongoing and systematic collection, analysis, interpretation, and dissemination of data about cases of a disease and factors influencing disease behavior, which is used as a basis for planning, implementing and evaluating disease prevention and control activities, including immunization.

Key elements of a Surveillance system

- detection and notification of VPDs
- investigation and confirmation (epidemiological, clinical, laboratory) of VPDs
- collection, analysis and interpretation of data
- feedback and dissemination of results
- prevention and control responses

Key elements of a surveillance system include detection and notification of VPDs; Investigation and confirmation of VPDs; Collection, analysis and interpretation of data; Feedback and dissemination of results and Prevention and control responses

Uses of Surveillance

Disease surveillance enables the following:

- predicting or detecting disease outbreaks for containment (***What*** disease is occurring)
- identifying high-risk populations (***Who*** gets the disease)
- identifying areas requiring special attention and where system performance is poor (***Where*** the disease is occurring)
- determining the frequency of occurrence of a disease in the community and magnitude of the problem (***When*** the disease is occurring and ***how many*** get the disease)
- identifying underlying causes (or risk factors) of the disease (***Why*** the disease is occurring)
- guiding response activities, including immunization (***How*** the disease can be prevented, controlled or eliminated).

Prerequisites for effective Surveillance

- ***Standard case definitions*** (to ensure uniformity in reporting)
- ***Recording and reporting system*** (to ensure regularity in reporting)
- ***List of all the reporting units*** (to ensure completeness in reporting)

The quality of surveillance data depends upon correct diagnostic criteria, timeliness and completeness of reports.

Steps in Conducting Surveillance

The five steps in surveillance, carried out at various levels (sub-center upwards), include:

Step1: Collect data

Collect data on the ***cases and deaths*** due to all VPDs in your area. The three different data collection methods are:

Passive/Routine Surveillance: Data is collected and reported ***monthly*** by all the reporting units (from the SC upwards) in the UIP format. However, ***Weekly*** reporting is required for AFP surveillance. Detailed information regarding individual cases is essential for diseases under eradication or elimination such as poliomyelitis and Neonatal tetanus.

Reliable sources of data for routine surveillance include

outpatient and inpatient registers, and individual patient records, including:

- Cases that have visited a government health facility for treatment
- Cases seen by health workers during outreach immunization sessions
- Cases treated at non-government health facilities e.g. private practitioners, NGO-run hospitals etc.
- Cases that were reported by ASHA/AWW/community or the media and verified by the visit of a health worker

Active Surveillance: implies the collection of data on specific VPDs, through the review of records during regular visits to selected health facilities, reporting sites or the community. This method is used

- During outbreaks to determine the extent of the outbreak and keep mortality rates low by initiating early treatment.

- When a disease is targeted for eradication or elimination (e.g. polio eradication) every possible case must be found and investigated.

Active Surveillance does not replace passive surveillance, but if conducted regularly and frequently it has the following advantages over passive surveillance, as it:

- helps to improve the timeliness and accuracy of case detection and notification
- enables rapid case investigation, including collection of laboratory specimens
- helps to link cases epidemiologically.
- enables timely action to be taken in response to the detected case
- identifies areas where passive surveillance needs to be strengthened.

Sentinel Surveillance: Data is collected through reports from selected 'sentinel' sites, to understand the disease burden, monitor trends and detect outbreaks. This system is used when high-quality data are needed about a particular disease that cannot be obtained through a passive system e.g. in AFP surveillance. The sentinel site is usually a

hospital, health center, laboratory, rehabilitation center or other facility which attends to a relatively large number of cases of the disease.

An efficient immunization surveillance system includes a combination of passive, active and sentinel surveillance.

Reporting units for VPD Surveillance

A reporting unit is a health facility/individual in private or public sector, located in rural or urban area. Designated health workers/paramedical staff and medical officer/practitioner working in various health facilities collect information on VPDs in the specified formats and report these in a timely manner to the next higher level.

	Public Sector	**Private Sector**
Rural	SC, Rural dispensary, Additional PHC, PHC, CHC, DH	Sentinel private Practitioner and sentinel hospital
Urban	Urban hospital, ESIH, Railway Hospital, Medical college hospital and others	Sentinel private nursing home, sentinel hospital, Medical college, Private and NGO laboratory.

Follow these rules when reporting the total number of cases and deaths seen during a reporting period (month or week):

- ***Zero reporting:*** Submit nil reports even if there are no VPD cases seen.
- ***Avoid double counting:*** if a child makes two visits to the health center for the same disease episode count it as one case only.
- Count only those cases which have been ***diagnosed by the health personnel***.
- ***Count current cases only:*** Include only those cases that occurred within the time frame specified for the VPD.

Report the occurrence of any unusual clustering of VPD cases or any death immediately by telephone, fax, email, special messenger etc. This verbal report must be followed by a written case based report.

Step 2: Compile data

In terms of passive surveillance, you need to know how many VPD cases are occurring and where they are occurring. The essential data you should receive from each reporting unit in the UIP report of all sub-centers/ PHCs is the number of cases and deaths of each of the targeted diseases counted during the reporting period.

In terms of active surveillance, additional information should include the:

- Vaccination status of each case;
- Name, age and sex of each case;
- Date and place of onset of symptoms

Compile the data to describe the VPDs in terms of time, place and person. This can be done by tabulation or drawing of graphs, bar charts or maps. *Table 10.1* describes the immunization status of measles cases (among infants older than 9 months of age) regarding a Measles outbreak in five SCs in a PHC.

Table 10.1: Example of a Measles Outbreak

Sub-center	Cases	Cases immunized	% immunized
Kushalgarh	21	2	10%
Talwara	17	1	6%
Arthuna	18	1	6%
Jhalod	15	2	13%
Partapur	19	1	5%
Total	90	7	8%

Step 3: Analyze and interpret the data

Regularly review the data from routine reports and check if it crosses the ***threshold level***[18]. If the cases are approaching the threshold level or have crossed it, then suspect an outbreak. Analyze the reports for surveillance quality as follows:

1) Completeness of reporting

The number of reports received divided by the number of reports expected, expressed as a percentage. If the completeness of reports was only 50%, then the disease incidence would be under-reported by 50%.

2) Timeliness of reporting

The number of reports received on time divided by the number of reports expected expressed as a percentage. The definition of 'on time' must be clear to reporting units.

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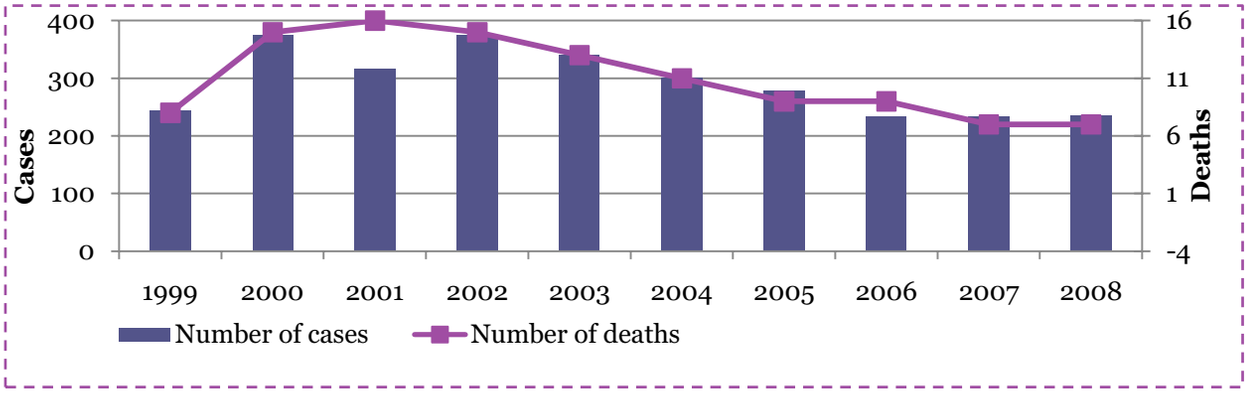
[18] Threshold levels are determined based on three criteria:
1. Pre-existing National/Internationally developed thresholds: e.g. a single case of measles in a tribal area is considered an outbreak
2. Based on Historical Data: e.g. if data for a particular disease is available, then the monthly mean should be calculated for the previous three years (excluding months in which there was an outbreak).
3. Increasing trends of the disease over a short duration of time (e.g. in weeks). If the number of cases is found to be much below the threshold, you could interpret it as no cause for worry. Alternatively, you could check for under-reporting or review the threshold value.

3) Description by time, place and person (when, where and who gets the disease?)
When the disease is occurring?

Compare the number of cases and deaths with previous weeks/ months/ years to see if there are any seasonal or cyclic trends. Table, bar or line diagrams are tools that enable analysis across time (temporal). These tools will help you to understand any increase or decrease in the incidence of a disease or the number of deaths for a particular reporting unit (as compared to other reporting units). *Figure 10.1* shows yearly trend of measles cases and deaths in a tabular and graphic form.

Figure 10.1: Annual Measles cases and deaths

Disease	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Measles Cases	243	375	315	375	340	301	279	233	233	234
Measles Deaths	8	15	16	15	13	11	9	9	7	7



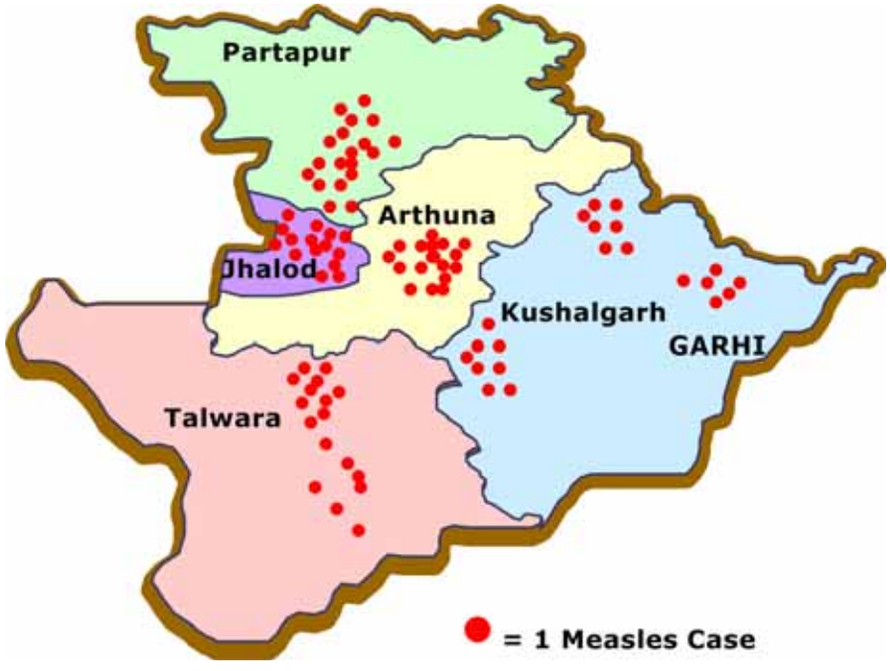
The above data could be interpreted in the following manner. The ***increasing*** number of cases from 1999 onwards indicates a potential outbreak, improved reporting or a change in the detection and reporting protocols. The ***decreasing*** number of cases from 2002 onwards indicates improved control measures, under-reporting due to incomplete reports or change in the detection and reporting protocols. The plateau in the graph from 2006 onwards

indicates either a stable situation or under reporting because of incomplete reports.

Where the disease is occurring?

Diseases tend to ***cluster*** in a particular area. Clustering indicates that a large number of similar cases have occurred in a limited geographical area or have occurred around the index case. This provides an idea of the causative and predisposing factors that may have played a role in the occurrence of the VPD. *See Figure 10.2.*

Figure 10.2: Measles Spot Map



A ***Spot map*** is a tool that enables analysis across space (spatial). It shows the occurrence of the cases, high-risk areas, areas of poor immunization coverage or areas with vacancies of HWs.

A Spot map helps to identify:

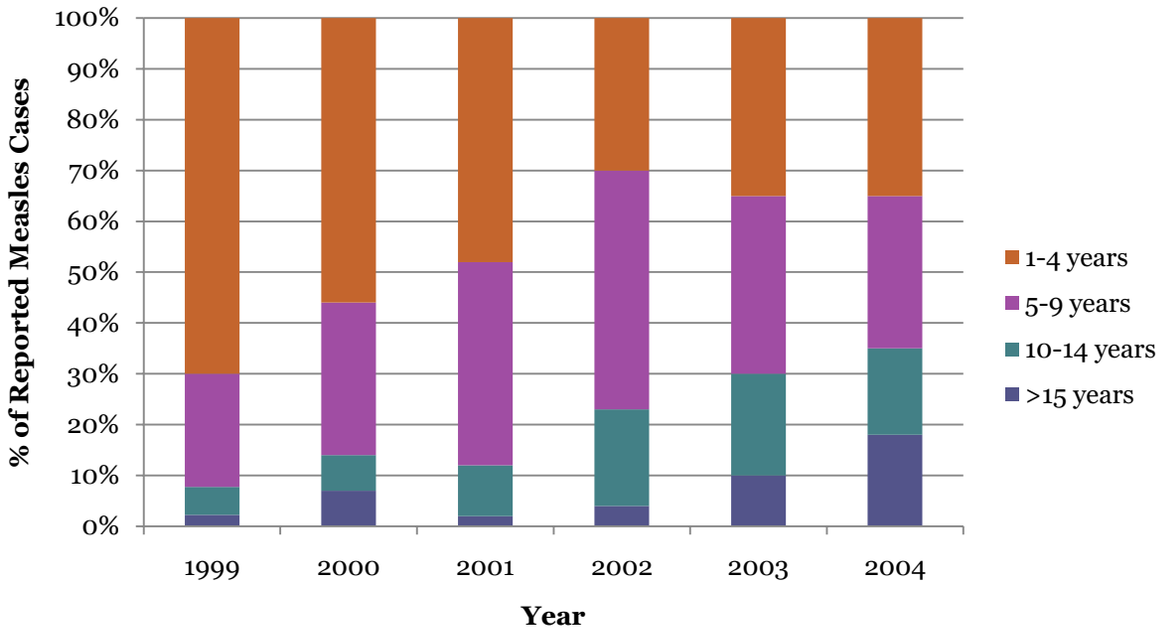
- Pockets from where cases are consistently reported

- Pockets from where cases are expected but not reported
- Disease trends in comparison to similar maps for the previous corresponding period.

Who gets the disease?

VPDs also tend to occur more in specific ages and sexes. Tables, bars or pie charts are tools that enable analysis across specific age and sex groups. A high proportion of un-immunized VPD cases are a reflection of low immunization coverage in the community. You could also compare incidence and case fatality rate between different reporting units and between public and private sources. *See Figure 10.3.*

Figure 10.3: Age Distribution of Reported Measles Cases



Step 4: Take action

After analysis and interpretation of data, take action to correct any problems identified to prevent avoidable morbidity and mortality. If you find that there are:

- More cases than you expect: Conduct an outbreak investigation and response.
- Cases occurring in vaccinated children: This could be due to over-reporting, vaccination given at the wrong age; incorrect technique of administration or dosage and breaks in the cold chain. Possible interventions to deal with these could be improved supervision, capacity building and strengthening the cold chain.
- Fewer cases than you expect: This could be due to under-reporting of cases or actual improvement of services. If the latter is true, there is no need for action.

Step 5: Provide Feedback

Feedback to the reporting sites refers to:

- Commenting on the completeness, timeliness and accuracy of the surveillance reports;
- Informing about the effectiveness of the vaccination activities in meeting the objectives of disease reduction;
- Offering information to help them in solving problems;
- Congratulating the good performers and encouraging them to do a better job.

Feedback is essential to keep the staff motivated to achieve high levels of immunization coverage and to collect accurate and complete data on the occurrence of target diseases. It may be ***urgent*** for an outbreak or individual cases or ***specific*** e.g. the laboratory results of each AFP case. Feedback to the community helps increase community trust and involvement. It must be shared during monthly meetings as well as during visits to the reporting units.

Outbreak Investigation, Response and Control

An ***outbreak*** is defined as the occurrence of an illness in a community, clearly in excess of the expected numbers. Usually an outbreak is limited to a small focal area. When an outbreak covers a larger geographic area and has more than

one focal point, it is termed as an epidemic. ***Outbreaks are defined differently for different VPDs. For diphtheria, polio, neonatal tetanus or JE, even a single case is an outbreak, whereas for measles and pertussis, a sudden increase in the number of cases is an outbreak. Refer to GoI guidelines for surveillance and outbreak response for AFP and Measles[19].***

Warning signs of an impending outbreak are:

- Clustering of cases or deaths in time and/or space
- Occurrence of two or more epidemiologically linked cases of meningitis or measles
- Shifting in the age distribution of cases

Investigation of an outbreak helps to:

- control and limit its spread to other areas
- ascertain its etiology and understand why it occurred
- identify high risk areas and groups
- assess how prevention strategies can be strengthened to reduce or eliminate the risk of future outbreaks

Steps in Outbreak investigation

Prompt and timely action during an outbreak is critical to minimizing the damage and maintaining public trust in health and immunization services. The emphasis should be on saving lives. Without awaiting confirmation of a suspected outbreak, provide immediate logistic support to

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[19] *Field Guide: Measles Surveillance and Outbreak Investigation*, New Delhi, Government of India, 2006, (http://www.npsuindia.org/download/Measles%20Guide.pdf)
Field Guide: Surveillance of Acute Flaccid Paralysis, New Delhi, Government of India, 2005, (http://www.npspindia.org/download/Redbook.pdf)

the field teams. Once the cause of outbreak is confirmed, do not waste laboratory support for diagnosing every case since, standard case management for epidemiologically linked cases DOES NOT require laboratory confirmation.

Actions BEFORE an outbreak:

Form an Epidemic Response Team (ERT) which may include representatives from:

- Local health officials (DIO/ any district level epidemiologist/ district officer in charge of surveillance and the concerned BMO)
- Hospital Clinician/ Public Health Nurse
- Laboratory representative
- NGO representative/ Community leader
- Others as appropriate

The team that has been formed at district level should hold a meeting as soon as a suspected outbreak is identified. It should decide on the area to be surveyed, plan and guide the outbreak investigation, monitor progress in data collection, compile and analyze data and write a final report.

Actions DURING an outbreak

Step 1: Confirm the outbreak

Confirmation of an outbreak is done through two related steps. Firstly, you have to visit the area concerned and confirm the diagnosis of as many reported cases as possible. Next, you should ascertain its geographical spread through a preliminary search.

Confirm the diagnosis by**:**

Clinical criteria: according to the standard case definition using information obtained by history and examination

Epidemiological association: If an outbreak has been confirmed and similar cases in the same area in the same period of time are reported by health workers, but not investigated individually, they may be confirmed by epidemiologically linked association with confirmed cases.

Laboratory tests: For VPDs subject to eradication or elimination, collect laboratory specimens from every suspect case (e.g. stool sample from each AFP case). For VPDs subject to control, collect specimens from a sufficient number of cases (e.g. five blood samples in case of a measles outbreak) to confirm the outbreak. However, no laboratory specimens are required for neonatal tetanus.

Ascertain the geographical extent of the outbreak to the surrounding villages/ blocks. The search for additional cases must include visits to:

The health facilities: Talk to the doctors and nurses to see if they are seeing suspected cases of the VPD. Visit hospital wards and outpatient departments and search all patient registers for cases that fit the standard case definition.

The community: Visit the area from where cases have been seen in the health facilities. Talk to volunteers and other influential persons in the community. If feasible, organize a rapid house-to-house search of the affected area(s) to

search for similar cases. Identify key informants in each village / ward for prompt information about any cases.

Step 2: Conduct house-to-house searches to find additional cases and provide case management

Train and assign health workers to conduct house-to-house searches to find the cases in the designated area. The logic is to list all the cases of VPD that have occurred in the recent past. Investigate cases using one disease-specific 'Standard Case Investigation Form' (CIF) for each case. Record the full details, including identification data, address, vaccination status and the travel history. (*See Appendix 10.2*)

Provide ***standard case management/treatment*** to the cases. ***Trace contacts***[20] to establish chains of transmission for containment measures such as ***Outbreak Response Immunization*** (ORI) in Measles, Polio, etc. If a new case or outbreak has been detected, search for additional cases of the VPD. For example, for a suspect measles or diphtheria case, enquire whether there are any other contacts (in the specific age group) in the household or neighborhood. Provide need-based prophylaxis and/or immunization to the contacts (e.g. vitamin A for measles, vaccination for diphtheria). Health workers should notify the cases with complications to the supervisor for further referral.

During the course of investigation, it may be possible that some other areas (not included in initial planning) may report fresh cases of the VPD. Arrange to undertake case searches in these new areas as well.

[20] A contact is a person who has been in close association with a known or suspected case of a communicable disease during the incubation period.

Step 3: Line list and notify the cases

From the Case Investigation Forms, create **a *line list*** of all cases including the name, address, age, sex and immunization status. Include laboratory results as soon as these become available. Record these in the suggested line list as shown in *Table 10.2*.

Table 10.2: Line List of Measles Cases

Patient's name, Father's Name and Address	Sex (M/F)	Age (in years and months)	Immunization status (Doses of concerned vaccine)	Date of onset of symptoms (dd/mm/yy)	Date of lab specimen collection (dd/mm/yyyy)	Outcome of illness (still ill/ died/ recovered)	Remarks
1. Harsha d/o Ram Swaroop, Regarpura	F	2 yrs	Un-immunized	28/12/ 07	27/1/08	Recovered	
2. Munna, s/o Md Nazim, Char Darwaza	M	11 mths	Un-immunized	6/1/08	27/1/08	Still Ill	

Report the cases immediately to the ERT in both the CIF and the line list consolidating data acquired from all the CIFs.

Step 4: Describe the outbreak

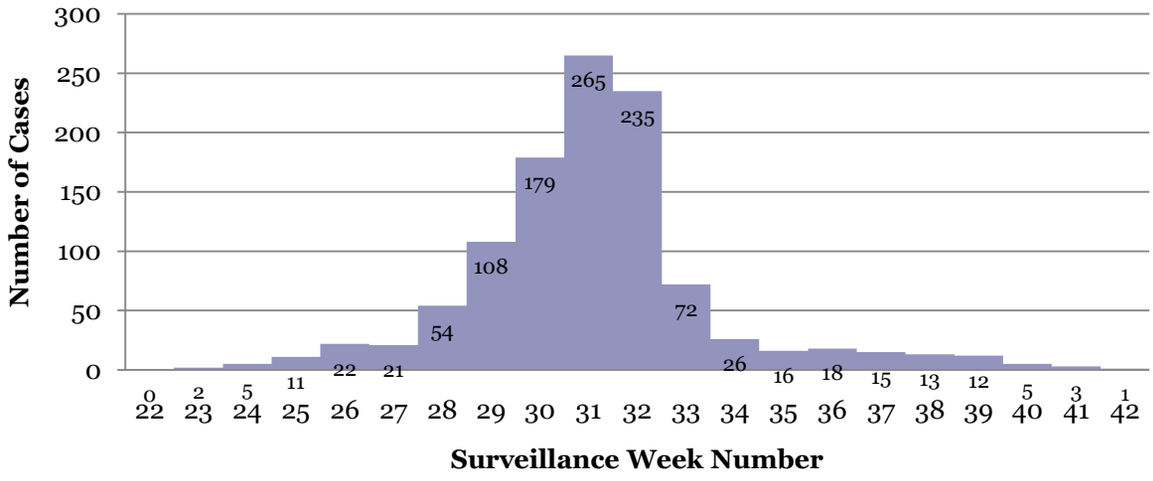
Describe the outbreak in terms of time, place and person.

Time: What are the dates of onset of cases?

Plot these to prepare an ***Epidemic curve*** i.e. a graph showing cases by date of onset or by date of report (*See Figure 10.4*). It helps to demonstrate where and how an

outbreak began, how quickly the disease is spreading, the stage of the outbreak (start, middle or ending phase), and whether control efforts are having an impact.

Figure 10.4: Reported measles cases by week of rash onset



Place: Where do cases reside?

Prepare a ***Spot map*** (*See Figure 10.2*) of the area showing the location of all confirmed cases. It helps to identify areas with clusters of disease. Further investigation of these areas may reveal weaknesses in the local immunization program.

Person: Who are affected?

The Graph or table of age distribution and immunization status of cases (*See Figure 10.3*) are prepared from the line list of cases. This information helps to identify the most affected age-groups and those cases which were not preventable (e.g. those developing measles before the scheduled age of immunization).

Step 5: Analyze the data to:

- Confirm the outbreak:
  - Is the number of cases reported greater than the number expected for this period? (e.g. threshold)
  - What proportion of cases fulfill the case definition?
- Define the extent of the outbreak (time, place and person)
- Measure the severity of the outbreak. What proportion of confirmed cases were
  - hospitalized,
  - suffered complications or
  - died (Case Fatality Rate)[21]
- Measure the effectiveness of vaccination
  - How many confirmed cases occurred in vaccinated individuals and in unvaccinated individuals?
  - How effective was the vaccine at preventing infection (Vaccine Efficacy)[22]?

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[21] **Case-Fatality Rate (CFR)** is based on the case investigations and the total number of confirmed cases. If possible, estimate it by age-group.
CFR = No. of patients who died of a specific VPD/Total No. of cases of the same VPD X 100

[22] **Vaccine efficacy (VE)** is the ability of the vaccine to prevent disease effectively and is affected by the age at immunization, potency of the vaccine (quality of cold chain) and overall immunization coverage.
VE =

$$\frac{\text{(Attack Rate among unvaccinated (ARU) - Attack Rate among Vaccinated (ARV)}}{\text{(Attack Rate among unvaccinated (ARU)}}$$

Attack Rate is an incidence rate (usually expressed as a percent), used only when the population is exposed to a VPD for a limited period of time, such as during an outbreak. It is calculated as follows:
AR=

$$\frac{\text{Number of new cases of a VPD during a specified time interval}}{\text{Total population at risk during the same interval}} \times 100$$

Step 6: Use the data for action

Use data on the various components of the immunization system such as coverage, status of the cold chain, training and availability of personnel to determine the causes of the outbreak. The reasons why susceptibles accumulate in a group could be the following.

Failure to give vaccine: A high proportion of unvaccinated among the cases in an outbreak would suggest that failure to vaccinate children was a significant factor. Spot maps will help to locate cases, high-risk areas and clusters of cases indicating a failure of the program to reach a specific geographic area or population subgroup.

Vaccine failure: The vaccines currently in use are relatively safe and effective. However, these vaccines are not 100% effective. For example, the efficacy of measles vaccine is estimated to be approximately 85% when given at 9 months.

Cold chain failure: If the efficacy of the vaccine appears to have been low across all age groups, especially during a specific period of time, review the cold chain to ensure that it has been functioning correctly. Identify and rectify the factors contributing to a cold chain failure.

Step 7: Write the report

After conducting the outbreak investigation, prepare a short comprehensive report with the following sections:

- Introduction and background information about the area affected (population structure, health facilities, regularity of RI sessions, health seeking behavior)

- Review of status of VPDs and routine immunization (coverage data)
- Short review of the VPD outbreaks in the past
- VPD reporting and surveillance system
- Confirmation of outbreak by serology (lab reports)
- Data collection methodology (sample size, number of investigating teams, approach etc.)
- Data analysis
  - Time, place and person analysis of cases (charts, graphs, spot maps etc.)
  - Age distribution and vaccination status analysis
  - Analysis of Case Fatality Rate
  - Probable reasons of outbreak
- Population at risk
- Case management
- Response to outbreak
- Conclusions and recommendations

Send the outbreak investigation report to concerned district and state government officers (*See Appendix 10.3*).

Step 8: Give feedback

Provide feedback to all levels (Community/ SC/PHC/CHC/District) on the outcomes of the VPD outbreak investigation, in order to ensure that all stakeholders are aware of the reasons for the outbreak, the actions initiated and the plan to prevent future outbreaks.

Step 9: Initiate action

In all VPD outbreaks, effective case management and follow-up of cases[23] is a priority. Thereafter, conduct activities for strengthening and raising awareness of routine immunization.

[23] Follow-up should be according to specific guidelines e.g. re-visit AFP cases after 60 days of reporting

Eradication, Elimination and Control of VPDs: the role of Surveillance

Surveillance plays a critical role in Poliomyelitis Eradication, Neonatal Tetanus Elimination and Measles Control.

Polio Eradication means that there are no clinical cases of poliomyelitis for three consecutive years and the circulating wild polio virus is eliminated from the environment. The target for global certification of polio eradication is 2010. Surveillance of Acute Flaccid Paralysis cases is one of the four pillars of eradication.

Neonatal Tetanus Elimination is defined as a rate of less than 1 case per 1000 live births in every district. However, since TT immunization is very effective and clean delivery practices substantially reduce risks of Neonatal Tetanus, all PHCs and districts are expected to have zero cases of Neonatal Tetanus. Globally year 2010 has been set as target year for NNT elimination. In order to achieve this, there is a need to strengthen the surveillance system and to undertake follow-up action in areas from where cases are reported. Even a single case of Neonatal Tetanus should trigger follow up action to prevent cases in the future. All the neonatal deaths should be investigated to exclude Neonatal Tetanus.

Measles Control requires reduction in measles mortality by two-thirds by 2010 (compared to 2000 estimates), at least 90% coverage with Measles vaccine in 80% of the districts of the country (by 2009) and collection of good quality epidemiological data through active surveillance (cases and deaths by month, age and vaccination status) and outbreak investigation.

APPENDIX 10.1: NEW VACCINES

Disease	Vaccine	Age	Dose	Schedule	Route	Site	Booster	Main Contraindications (refer to Manufacturer)
Measles, Mumps Rubella	MMR	12-15 mths	0.5 ml	1 dose	SC	Upper Arm	No	Advanced Immuno deficiency or immuno suppression, Pregnancy, Severe allergic reaction to vaccine component or following a prior dose
Measles, Rubella	MR	16-24 mths	0.5 ml	1 dose	SC	Upper Arm	No	
Typhoid	Whole Cell Typhoid Vaccine	6-9 mths onwards	0.25ml / 0.5 ml	2 doses 4 wks apart	SC	Upper Arm	3-5 years	Severe allergic reaction to vaccine component or following a prior dose
	Vi Polysaccharide Vaccine	at or after 2 years	0.5ml	1 dose	IM		3 years	
	Typhoid Oral Ty21a	5 years and above		3 capsules on alternate days	Oral	Mouth	3-7 years	
Streptococcus pneumoniae	Pneumococcal PCV7	below 6 mths	0.5 ml	3 doses Given at ages 2, 4, 6 mths; (minimum interval, 4 wks)	IM	Upper Arm	12-15 mths (minimum interval, 8 wks)	Severe allergic reaction to vaccine component or following a prior dose Moderate or severe acute illness
		7-11 mths		2 doses 4 wks apart				
		12-23 mths		1 dose			No	
		24-59 mths		1 dose				
	Pneumococcal PPV 23	≥ 2 years (high-risk)	25 mcg in 0.5ml	1 dose	IM or SC	Upper Arm	No	
Haemophilus influenzae type b	Hib PRP-T, PRP-OMP and PRP - CRM 197 conjugate vaccine	Initiate at 6 wks	0.5 ml	6, 10, 14 wks	IM	Upper Arm	No	Severe allergic reaction to vaccine component or following a prior dose; Moderate or severe acute illness
Rota Virus Diarrhoea	Rotarix™	Initiate before 12 wks		6 wks, 10 wks (no later than 24 wks)	oral	Mouth	No	Severe allergic reaction to a vaccine component or following a prior dose of vaccine; Infants with history of intussusceptions/ intestinal malformations
	RotaTeq™			2, 4, 6 months (to be completed by 32 wks)				

APPENDIX 10.2: NEONATAL DEATH INVESTIGATION FORMAT

Neonatal Death Investigation Format

I. General Information

1.State/UT *Rajasthan* 4.Physician's Name *Dr Ashok Saxena*
2.District *Banswara* 5.Date *23 Nov. 07*
3. Town (Mohalla/PHC/Village) *Paraspur* 6 Cluster No.

II. Background Information On Neonatal Death

1. Name of child *Mohit* 6. Add. of child *H. Mandir, Paraspur*
2. Sex of child *Male* 7. Name of person interviewed *Swarup Chand*
3. Father's name *Swarup Chand* 8. Relationship of person interviewed to child *Father*
4. Head of household *Kishan Chand* 9. Date of death of child *18 Nov 07*
5. Date of birth of child *11 Nov 07*

III. Symptoms Preceding Infant's Death (Please circle appropriate answer)

1. Was the infant able to suck milk after birth? (Yes) No
2. Did the infant stop sucking milk when illness began? (Yes) No
3. Did the infant have fever? Yes (No)
4. Did the infant have convulsions? (Yes) No
5. Was the infant noted to be still? Yes (No)

IV. Infant's Care Since Birth (Please circle appropriate answer)

1. Who delivered the child?
   - Doctor/LHV/ANM
   - Dai (trained)
   - (Dai (untrained))
   - Non-dai family members
   - Other (please specify)…….
2. Where was the child delivered?
   - Hospital/Health center
   - (Home)
   - In the fields
   - Other (please specify)……
3. When the child became ill, who treated the child?
   - Government health center
   - Regd. Physician (Allo./Ayurvedic/Homoepathic)
   - (Unregistered Physician)
   - No treatment was received

V. Mother's Immunization History

1. Does the mother know about vaccination with TT? Yes/ (No) (circle)
2. Number of doses received during this pregnancy *Nil*

VI. Other Information on Mother

1. Is the mother alive? (Yes) /No (Circle)
2. If dead, date of death -----
3. Symptoms preceding death -----

VII. Medical Officer's Diagnosis

1. Cause of neonatal death *Neonatal Tetanus*
2. Cause of mother's death -

(Signature of Medical officer)

APPENDIX 10.3: MEASLES OUTBREAK INVESTIGATION SUMMARY

Form VPD-OB004

MEASLES OUTBREAK INVESTIGATION: SUMMARY

Outbreak ID: RABNS002

Notification

First case reported by: *Shri Kashinath Soni* Name of DIO: *Dr Rathore*

Designation: *Supervisor* Name of SMO: *Dr P. K. Jain*

Date of notification of the first case: *21 January 08*

Location of the outbreak

Village / Urban ward affected: *Aajna* Sub-center: *Kushalgarh*

PHC/UHC: *Garhi* Block: *Garhi*

District: *Banswara* State: *Rajasthan*

Cross notification needed Yes / No

Preliminary search

Date/s of preliminary search: *23 January 08*

Number of health facilities searched: *1* Number of sub-centers/ urban wards searched: *0*

Number of areas* searched: *5* Total number of clinical measles cases: *48*

Date of Epidemic Response Team meeting: *24 January, 08*

Whether considered as an outbreak requiring house to house investigation: Yes / (No)

If No, reason:

Too small a sample

House to house outbreak investigation done in last three months in the same area

Others (specify)

If Yes, provide details of outbreak investigation below

Details of outbreak investigation

Date of pre outbreak investigation orientation: *25 January 08*

Date of outbreak investigation From: *27Jan* To: *28 Jan 08*

Number of health facilities involved: *1* Number of sub-centers/ urban wards involved: *1*

Number of areas* involved: *1* Total population investigated: *2300*

Total number of measles cases: *48* Total number of deaths due to measles: *0*

Date of onset of first case: *28 Dec, 07* Date of onset of most recent case: *22 Jan, 08*

Laboratory investigation details

Specimen code**	Age	Sex	Date of last measles dose	Date of collection	Date sent to lab	Date received in lab	Result Measles / Rubella/ Negative	Date of Result
RA BNS 002-38	8yr	F	No	27/1/08	28/1/08	31/1/08	Measles+	12/2/08
RA BNS 002-43	6yr	M	No	27/1/08	28/1/08	31/1/08	M +ve	12/2/08
RA BNS 002-46	3yr	F	No	28/1/08	28/1/08	31/1/08	M +ve	12/2/08
RA BNS 002-47	11mths	M	No	28/1/08	28/1/08	31/1/08	M +ve	12/2/08

Note: * Areas are villages, towns, municipalities or corporations.

** Specimen code is the code given to each sample of blood or urine. If sample collected is blood, specimen code will be outbreak ID-B-patient number or if the sample is urine, specimen code will be outbreak ID-U-patient number.

Data Analysis of Outbreak Investigation Outbreak ID: RABNS002

Age Group	No. of Measles cases received Measles Vaccine	No. of Measles cases NOT received Measles Vaccine	No. of Measles cases with unknown vaccination status	No. of non-Measles received Measles Vaccine	No. of non-Measles NOT received Measles Vaccine	No. of non-Measles with unknown vaccination status	No. of Deaths due to Measles	Total Popn	Age Specific Attack Rate	Age-wise Distribution of Measles Cases	Attack rate among not vaccinated /unknown (ARU)	Attack rate among vaccinated (ARV)	Vaccine Efficacy	Case Fatality Rate
	(A)	(B)		(C)	(D)		(E)	(F) (A+B+C+D)	((A+B/F) *100	((A+B)/(G+H)) *100	(B/(B+D)) *100	(A/(A+C)) *100	(ARU-ARV) /ARU	(E/(A+B))*100
<1 yr	2	5	0	8	12	0	0	27	25.9	14.5	29.4	20.0	31.9	-
1-4 yrs	4	16	0	15	21	3	0	59	33.8	41.6	40.0	21.0	47.5	-
5-9 yrs	0	10	0	9	14	2	0	35	28.5	20.8	41.6	-	-	-
10-14 yrs	0	7	0	5	9	11	0	32	21.8	14.5	43.7	-	-	-
>=15 yrs	0	4	0	2	17	8	0	31	12.9	8.3	19.0	-	-	-
Total	6 (G)	42 (H)	0	39	73	24	0	184	26.1	-	-	-	-	-

Any other relevant details:

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Acknowledgements

This handbook on the immunization training of Medical Officers is the result of team work between a large number of partners including:

- World Health Organization -National Polio Surveillance Project (WHO-NPSP)
- US Agency for International Development (USAID)/ IMMUNIZATION basics
- United Nations Children's Fund (UNICEF).

Other departments/organizations that have made contributions to the review of the handbook are:

- National Institute of Health and Family Welfare (NIHFW)
- Governments of Bihar, Delhi, Goa, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu and Uttar Pradesh
- Gajra Raja Med. College Gwalior
- Maulana Azad Medical College
- Patna Medical College
- World Health Organization, Geneva
- CARE India
- Program for Appropriate Technology in Health (PATH) India
- USAID/IMMUNIZATION basics, Washington DC
- Centers for Disease Control and Prevention (CDC) Atlanta