Dissertation Training

AT

National Health Mission, Haryana

ASSESEMENT OF COLD CHAIN MAINTAINENCE PRACTICES & KNOWLEDGE OF COLD CHAIN HANDLER AMONG COLD CHAIN POINT OF MEWAT DISTRICT, HARYANA

By

DILIP KUMAR PRAJAPAT

Under the guidance of

Dr.RADHIKA ADHOLEYA

POST GRADUATE DIPLOMA IN HOSPITAL AND HEALTH MANAGEMENT

YEAR 2012-2014

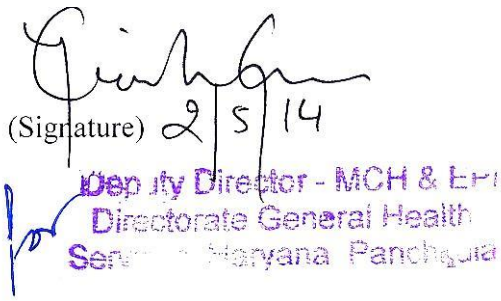
International Institute of Health Management Research
New Delhi

CERTIFICATE OF DISSERTATION COMPLETION

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Dilip Kumar Prajapat** has successfully completed his dissertation in our organization from February 5, 2014 to April 30, 2014. During this dissertation he has worked on project "**Assessment Of Cold Chain Maintenance Practices And Knowledge Of Cold Chain Handler Among Cold Chain Point Of Mewat District, Haryana**" & also co-ordinate for all child health Programmes under the guidance of me and my team at National Health Mission, Haryana.

We wish him/her good luck for his future assignments.



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This is to certify that **Dilip Kumar Prajapat** student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone dissertation training at National Health Mission, Haryana from

3-02-2014 to 30-05-2014.

The Candidate has successfully carried out the study designated to him during dissertation training and his approach to the study has been sincere, scientific and analytical.

The dissertation is in fulfilment of the course requirements. I wish him all success in all his future endeavours.

Dean, Academics and Student Affairs

IIHMR, New Delhi

Supervisor

IIHMR, New Delhi

CERTIFICATE OF APPROVAL

The following dissertation titled **"Assessment Of Cold Chain Maintenance Practices And Knowledge Of Cold Chain Handler Among Cold Chain Point Of Mewat District, Haryana"** at **"National Health Mission, Haryana** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name	Signature
S. V. Adhikari	
Dr Radhika	
Dr. Vinay Tripathi	

CERTIFICATE FROM DISSERTATION ADVISORY COMMITTEE

This is to certify that **Mr. Dilip Kumar Prajapat,** a graduate student of the **Post- Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. He/ She is submitting this dissertation titled "**Assessment of cold chain maintenance practices and knowledge of cold chain handler among district of Mewat, Haryana**" at "NATIONAL HEALTH MISSION, HARYANA" in partial fulfilment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management.**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Dr. Radhika Adholeya

IIHMR, Delhi

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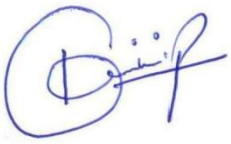
This is to certify that the dissertation titled "**Assessment of Cold Chain Maintenance Practices and Knowledge of Cold Chain Handler among Cold Chain Point of Mewat District, Haryana"** and submitted by Dilip Kumar Prajapat, Enrolment No. : PG/12/027 under the supervision of Dr.Radhika Adholeya for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from February 2, 2014 to April 30, 2014 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.



Signature

FEEDBACK FORM

Name of the Student: Dilip Kumar Prajapat

Dissertation Organisation: National Health Mission (Child health Division) Panchkula, Haryana

Area of Dissertation: Immunization Programme.

Attendance: 100% Attendence

Objectives achieved: the objective of dissertation set were acheived with full aim of acheiving programme goal.

Deliverables: ◦ Report of the dissertation (activity during field visit) was submitted at Headquater pled and copy also sent to district official.

Strengths: ◦ Team work ◦ Good interpersonal communication. ◦ hard working – consistent. ◦ work within time line. ◦ keen to know about the assignment allotted.

Suggestions for Improvement:

◦ Can scope for analytical approach.
◦ Report writing

Signature of the Officer-in-Charge/Organisation Mentor (Dissertation)

Medical Officer, Child Health
National Rural Health Mission
Haryana, Panchkula

Date:
Place:

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I would like to thanks all the Consultants of Child health department, especially **Dr.Sumit, Dr. Subhash, and Dr.Nistha** for giving me timely suggestions and help whenever I needed.

My heartiest thanks to my faculty guide **Dr.RADHIKA ADHOLEYA** for academic guidance at each and every step in the preparation of this report.

DILIP KUMAR PRAJAPAT

ACRONYMS

ATAGI	Australian Technical Advisory Group on Immunization
BCG	Bacille Calmette-Guérin [vaccine]
CHC	Community health centres
DF	Deep freezer
DLHS	District level household survey
DTP	Diphtheria-tetanus-pertussis [vaccine]
EPI	Expanded programme of immunization
Hib	Haemophilus influenza type b
ILR	Ice lined refrigerator
MDG	Millennium Development Goal
MDG 1	The first Millennium Development Goal
MDG 4	The fourth Millennium Development Goal
MMR	Measles-mumps-rubella [vaccine]
NHM	National health mission
NIP	National Immunization Program
OPV	Oral polio vaccine
PHC	Primary health centres
R&D	Research and development
RAPID	Regular Appraisal programme implementation in district
UIP	Universal immunization programme
UNICEF	United Nations international child emergency fund
WHO	World Health Organization

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Cold chain needs continuous supervision and assessment at different levels to prevent the loss of vaccine potency during storage and handling. RAPID is a model under the ideology of the supportive supervision. Components of the immunization are monitored using the checklists. Tool used for data collection was Pre-tested RAPID tool for health facility and Knowledge assessment questionnaire for cold chain handler. The main aim of the cross sectional study was done to assess the cold chain maintenance practices and knowledge of cold chain handler among cold chain points of Mewat district. It has 3 CHCs, 10 PHCs, 13 ILR points and 84 sub centres. I have taken 9 sample size out of 13 ILR points. In the study covers all block of Mewat district- Nuh, Punahana, and Firozpur zirkha .Under each block taken three PHC randomly. The results of the study reveals that component of the facility's RI micro plan availability observed in nine cold chain points, the results were founds Map of catchment area (100%), estimation of beneficiaries (100%), estimation of logistics (100%), ANM roaster or Immunization calendar (100%), Day wise plan for supervision (100%), ANM roaster displayed (58%), Coverage monitoring chats displayed (90%), Block meeting conducted (35%), Supervisory visits (90%). Component of correct placement of ILR and DF observed in nine cold chain points were found Supervisory visits (100%), ILR and DFs away from walls and other equipment (100%), ILR & DFs away from direct exposure with sunlight (100%), ILR & DFs connected through stabilizers (100%), Temperature log books for all ILR & DFs (100%), Twice daily monitoring of temperature (90%), Record of power failures/cuts, if it is applicable (90%), Record of defrosting ILR & DFs (85%), Periodic checks of temperature log book (100%). Component of ILR observed in nine cold chain points were found Functional thermometer in ILR (100%), ILR temperature +2◦c to +8◦c (65%), No frost or frost less than 5mm in ILR (100%),Vaccines vials correctly arranged in ILR (90%), No T-series or Hep B vaccines in bottom (100%), No items other than vaccines in ILR (100%), Vaccines in ILR with labels (100%), No reconstituted BCG & Measles vials in ILR (100%), Diluents placed in ILR 24 hrs before distribution (100%). component of DFs observed in nine cold chain points were found- Functional thermometer in DF (65%), DF temperature -15◦c to -18◦c (78%), No frost or frost less than 5mm in DF(100%),Ice packs correctly arranged in DF (100%), No RI vaccines in DF (100%). The cold chain handler facility wise overall knowledge Assessment average score (86%) was good but still there is improvement needed regarding shake test, open vial policy, freeze sensitive vaccine and heat sensitive vaccine which is essential component regarding maintenance of potency of vaccine during storage.

1.0 ORGANIZATION PROFILE

Name of organization National health mission Panchkula, Haryana.

Address BAYS NO.55-58, SECTOR-2, PANCHKULA, HARYANA

Genesis The National Rural Health Mission (NRHM) is an initiative undertaken by the government of India to address the health needs of underserved rural areas. Founded in April 2005 by Indian Prime minister Manmohan Singh, the NRHM was initially tasked with addressing the health needs of 18 states that had been identified as having weak public health indicators.

The Union Cabinet vide its decision dated 1st May 2013 has approved the launch of National Urban Health Mission (NUHM) as a Sub-mission of an over-arching National Health Mission (NHM), with National Rural Health Mission (NRHM) being the other Sub-mission of National Health Mission.

NHM has six financing components:
(i) NRHM-RCH Flexi pool,
(ii) NUHM Flexi pool,
(iii) Flexible pool for Communicable disease,
(iv) Flexible pool for Non communicable disease including Injury and Trauma,
(v) Infrastructure Maintenance and
(vi) Family Welfare Central Sector component.

Outcomes for NHM in the 12th Plan are synonymous with those of the 12th Plan, and are part of the overall vision. The endeavour would be to ensure achievement of those indicators

mention below. Specific goals for the states will be based on existing levels, capacity and context. State specific innovations would be encouraged. Process and outcome indicators will be developed to reflect equity, quality, efficiency and responsiveness. Targets for communicable and non-communicable disease will be set at state level based on local epidemiological patterns and taking into account the financing available for each of these conditions.

1. Reduce MMR to 1/1000 live births
2. Reduce IMR to 25/1000 live births
3. Reduce TFR to 2.1
4. Prevention and reduction of anaemia in women aged 15–49 years
5. Prevent and reduce mortality & morbidity from communicable, non- communicable; injuries and emerging diseases
6. Reduce household out-of-pocket expenditure on total health care expenditure
7. Reduce annual incidence and mortality from Tuberculosis by half
8. Reduce prevalence of Leprosy to <1/10000 population and incidence to zero in all districts
9. Annual Malaria Incidence to be <1/1000
10. Less than 1 per cent microfilaria prevalence in all districts
11. Kala-azar Elimination by 2015, <1 case per 10000 population in all blocks

2.0 INTRODUCTION

2.1 PROBLEM STATEMENT

Child Mortality

7.6 million children under the age of five die every year, according to 2010 figures (WHO, 2011) Over two-thirds of these early child deaths are due to conditions that could be prevented or treated with access to simple, affordable interventions. (WHO, 2011).Approximately 40% of child deaths occur in infants under one month old. (WHO, 2011).Children in low-income countries are nearly 18 times more likely to die before the age of five than children in high-income countries.

Impact of Vaccines

Vaccines are cost-effective and life-saving. In 2010, 109 million children were immunized with three doses of tetanus, diphtheria and pertussis vaccine (WHO, 2011)Vaccines prevent 2.5 million deaths every year in all age groups (WHO, 2011).Expanding coverage of vaccines at the national and sub national level could prevent 2 million additional deaths in children under 5 (WHO, UNICEF, World Bank, 2009).[1]

The "cold chain" is a system of transporting and storing vaccines within a recommended Temperature range of +2 to +8 degrees Celsius (°C). This temperature range has been Selected by the World Health Organization (WHO), and adopted by the Australian Technical Advisory Group on Immunization (ATAGI) for the National Immunization Program (NIP), as a guide to protect vaccines against loss of vaccine potency due to excessive cold or heat.[2]

Vaccine management is the responsibility of all staff. It is important that more than one staff member is educated on how to appropriately store vaccines, read and record daily refrigerator temperatures and reset data loggers and vaccine refrigerator monitors.

Management of a new vaccine refrigerator – All newly installed vaccine refrigerators need to be monitored continuously with a data logger for at least 48 hours prior to use to ensure the refrigerator has a stable reading within the recommended range of +2° to +8°C.

[1] http://www.action.org/resources/item/vaccine-preventable-deaths

[2] http://www.health.wa.gov.au/CircularsNew/attachments/623.pdf

Ongoing management of a vaccine refrigerator – To ensure optimal functionality, the vaccine refrigerator should be continuously monitored for 48 hours with a data logger at least once annually. If the refrigerator cannot maintain a temperature range of +2 to +8°C it should be serviced or decommissioned.

Vaccine refrigerators should be serviced as per the manufacturer's guidelines. Documentation of the service should be retained by the provider. Vaccine management is considered a key performance indicator for GP accreditation. Records of daily temperature readouts, weekly data logger readouts and annual refrigerator audits should be kept for accreditation purposes.[3] All vaccine service providers play a vital role in maintenance of the cold chain to ensure the efficacy and safety of vaccines administered. Maintaining cold chain standards is vital given the large number of vaccines now stored within each practice/clinic and the cost attached to these vaccines.

Immunization Programme is one of the key interventions for protection of children from life threatening conditions, which are preventable. It is one of the largest immunization programmes in the world and a major public health intervention in the country.

Immunization Programme in India was introduced in 1978 as Expanded Programme of Immunization (EPI).The programme gained momentum in 1985 and was expanded as Universal Immunization Programme (UIP) to be implemented in phased manner to cover all districts in the country by 1989-90.UIP become a part of Child Survival and Safe Motherhood Programme in 1992 Since, 1997, immunization activities have been an important component of National Reproductive and Child Health Programme and is currently one of the key areas under National Rural Health Mission (NHM) since 2005.

Under the Universal Immunization Programme, Government of India is providing vaccination to prevent seven vaccine preventable diseases i.e. Diphtheria, Pertussis, Tetanus, Polio, Measles, severe form of Childhood Tuberculosis and Hepatitis B.[4]

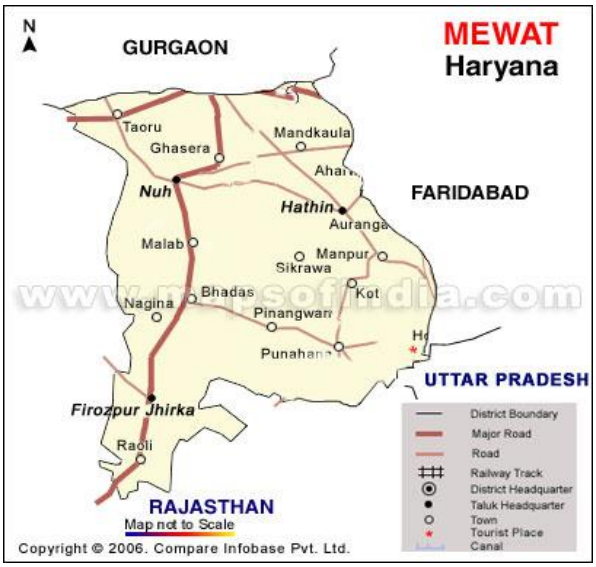
RAPID (Regular Appraisal of Program Implementation in District) is a model under the ideology of the supportive supervision. Components of the immunization are monitored using the checklists. It covers program management, cold chain and vaccine management, records and reports, immunization safety both at the planning units and at the immunization sessions.

[3] http://www.health.wa.gov.au/CircularsNew/attachments/623.pdf

[4]http://nrhm.gov.in/nrhm-components/rmnch-a/child-health-immunization/immunization/background.html

In this study using this (RAPID) tool, assessed the cold chain and vaccine management, stock register as well as knowledge assessment of cold chain handler.

2.2 DISTRICT PROFILE



District Mewat has a population of 10,72,861 according to the 2011 census. Fully immunized status of the district is 12% according to DLHS-III and 24.57% as per WHO coverage evaluation 2010-11. It has 3 CHCs, 10 PHCs, 13 ILR points and 84 sub centres.

2.3 REVIEW OF LITERATURE

2.3(a) Assessing *cold chain status in a metro city of India: An intervention study*

Cold chain maintenance is an essential activity to maintain the potency of vaccines and to prevent adverse events following immunization. One baseline study highlighted the unsatisfactory cold chain status in city of Kolkata in India. This study was carried out to assess the changes which occurred in the cold chain status after the intervention undertaken to improve the status and also to assess the awareness of the cold chain handlers regarding cold chain maintenance. Re-evaluation of cold chain status was done at 20 institutions selected by stratified systematic random sampling after the intervention

Significant improvement had been observed in correct placing of cold chain equipment, maintenance of stock security, orderly placing of ice packs, diluents and vaccines inside the

equipment, temperature recording and maintenance. But awareness and skill of cold chain handlers regarding basics of cold chain maintenance was not satisfactory.[5]

2.3(b) *Evaluation of Vaccine Cold Chain in Urban Health Centres of Municipal Corporation of the Surat City, Western India*

The aim of the study was to assess the condition of cold chain equipment, practices adopted for cold chain maintenance and knowledge of the vaccinators. It was a cross-sectional study conducted in 20 UHCs of Surat Municipal Corporation (SMC). Cold chain equipments were observed with regards to their condition, along with the practices adopted by vaccinators for cold chain maintenance. A pre-designed and pre-tested questionnaire was used to interview the vaccinators regarding their knowledge and awareness regarding cold chain practices, management and handling

Absence of separate stabilizer for deep freezers and ILRs (85%), ill-maintained temperature-record register, lack of criss-cross pattern of ice packs in deep freezer (65%), presence of things other than ice packs in deep freezer (10%) and things other than vaccines in ILR (10%) indicate poor cold chain maintenance. In addition to this, expired vaccines in ILR (5%), vaccines in the "unusable" stages of VVM (15%), lack of emergency contact number nearby in case of cold chain failure (85%), lack of inverter (85%), lack of generator (85%) and failure to note time of reconstitution on the vaccine vial at the time of vaccination (25%) indicate poor cold chain practices. Lack of knowledge of defrosting of ILR and deep freezer (45%), lack of knowledge about Shake test (40%), lack of knowledge of temperature range to be maintained in deep freezer (70%) and in ILR (15%) indicate poor knowledge of vaccinators.[6]

2.3© *Evaluation of cold chain system in Chandigarh during PPI campaign 2001-2002.*

The aim of the study was to evaluate the maintenance of cold chain system (CCS) in intensified pulse polio immunization (IPPI) programme, during December 2001 and January 2002 in Union Territory (UT) Chandigarh.

[5] S Mallik (et al), Dept of Community Medicine, Midnapur Medical College, West Bengal (March 2011)- Assessing cold chain status in a metro city of India: An intervention study

[6] Ashish K. Naik (et al), Dept of Community Medicine , Surat Municipal Institute of Medical Education and Research , Surat , Gujarat (Dec 2013)- Evaluation of Vaccine Cold Chain in Urban Health Centres of Municipal Corporation of the Surat City, Western India

A Cross sectional time bound study was conducted in seven centres, where OPV vials were stored prior to IPPI and 20 IPPI Booths in UT, Chandigarh. Booths were selected by stratified random sampling technique. The status of cold chain equipments was assessed at headquarters of IPPI, 6 regional (distribution) centres, 20 IPPI posts and 5 house to house teams.

The cold chain sickness rate was found to be 9.7% in January, 2002. There were reports of breakdown of cold chain maintenance due to defective plugs and sockets, faults in thermostat, leakage of gas. But all vaccine samples picked up randomly were reported potent, as per the test reports provided by Central Research Institute (CRI), Kasauli during the period of study.[7]

2.3(d) *Assessment of cold chain status for immunization in central Ethiopia*

The objective of the study was to assess the cold chain status and practices in 116 health facilities located in three CCRDA/CORE Group Ethiopia operational districts (woredas). An institution based cross-sectional study was conducted in December 2011 and January 2012 in three districts (woredas) of Oromiya, SNNP and Amhara Regions of Ethiopia, data was collected from 116 health facilities and from the same number of immunization service providers. Multiple logistic regression analysis was carried out to identify factors related to knowledge of cold chain management.

Of 116 visited facilities, only 22 (19%) had functional refrigerators. The remaining facilities transported vaccines from nearby facilities having functional refrigerators. Complete temperature recording of the last month was observed in 13 (59.1%) facilities. Of 22 functional fridges, the thermometer reading was found to be outside the recommended range in 6 (27.3%) on the date of data collection. Vaccine storage in the refrigerator was not proper in 12 (54.5%) facilities. Sixty-five (56%) health workers had satisfactory knowledge on cold chain management. Professional qualification and year of service in the immunization program showed a statistically significant association with knowledge of cold chain management ($P < 0.05$).[8]

2.3(e) *Program on immunization and cold chain monitoring: the status in eight health districts in Cameroon.*

[7] Goel NK (et al), Dept of Community Medicine, Govt. Medical College, Chandigarh (Oct- Dec 2004)- Evaluation of cold chain system in Chandigarh during PPI campaign 2001-2002.
[8] Rogie B (et al) Addis Continental Institute of Public Health, Addis Ababa, Ethiopia. (July 2013)- Assessment of cold chain status for immunization in central Ethiopia

Cold chain monitoring is a precondition to ensure immunization quality, efficacy and safety. This study was conducted to assess the status of cold chain in eight health districts in Cameroon. The study was carried out in eight health districts out of fifty with poor immunization coverage rate. Data were collected using a validated form by observation and consultation of related documents. Health Centers (HC) randomly selected were targeted per health district. Forty health facilities were included.

Twenty eight (70.0%) had at least one functional refrigerator for EPI activities. The power supply was reported to be permanent in 7 (20.6%) out of 34. (85.0%) health facilities with access to power supply. The temperature monitoring chart was pasted on 27 (96.4%) of the cold chain equipment. On 16 (59.3%) of these charts, the temperature was recorded twice daily as recommended. Seven (25.9%) of 27 refrigerators assessed had temperature out of the recommended range of 2 to 8°C. Almost 23.30% of health centers did not received any supervision on cold chain monitoring during a vaccination campaign.[9]

2.3(f) *Cold chain maintenance in vaccines: a systematic review*

Systematic immunization programmes mostly depend on the correct maintenance and manipulation of the vaccines to be used, i.e. perfect maintenance of the cold chain. Therefore, a systematic review of the literature on the cold chain and vaccines was carried out, to identify daily practices in vaccine sites. A literature search was performed in the main medical databases for documents published between 1990 and 2005, including those performed by means of a survey and/or inspection of vaccine sites that provided the following data: a designated health officer, availability of a thermometer with maximums and minimums, refrigerator temperature at the time of the visit, and temperature control and registration. For all the variables, the mean prevalence was calculated with a 95% confidence interval.

Three hundred seventy-seven articles were found; 31 were initially selected and 13 were finally included. In 72.21% of the vaccine points, there was an officer responsible for the vaccines, but only 61.43% knew the optimal temperature range. Fifty-five percent of these

[9] Ateudjieu J , Kenfack B (et al) Department of Biomedical Sciences, University of Dschang, Cameroon, Dschang, Cameroon.(March16, 2013)- Program on immunization and cold chain monitoring: the status in eight health districts in Cameroon.

points had a thermometer with maximums and minimums and only 26.88% carried out temperature controls and registrations at least once per day.[10]

2.3 RATIONALE

Cold chain needs continuous supervision and assessment at different levels to prevent the loss of vaccine potency during storage and handling. This is important as new and expensive vaccines that require different approaches to storage are introduced. This study was done to assess the cold chain maintenance practices and knowledge of cold chain handler among cold chain points of Mewat district.

2.4 OBJECTIVES

- To assess the cold chain maintenance practices among facilities of Mewat as per cold chain guideline.
- To check the knowledge of cold chain handler regarding cold chain in district Mewat.

[10] Ortega Molina P(et al), Department of Preventive Medicine and Public Health, Faculty of Medicine, Complutense University of Madrid, Madrid, Spain. (July- August, 2007)- Cold chain maintenance in vaccines: a systematic review

3.0 METHODOLOGY

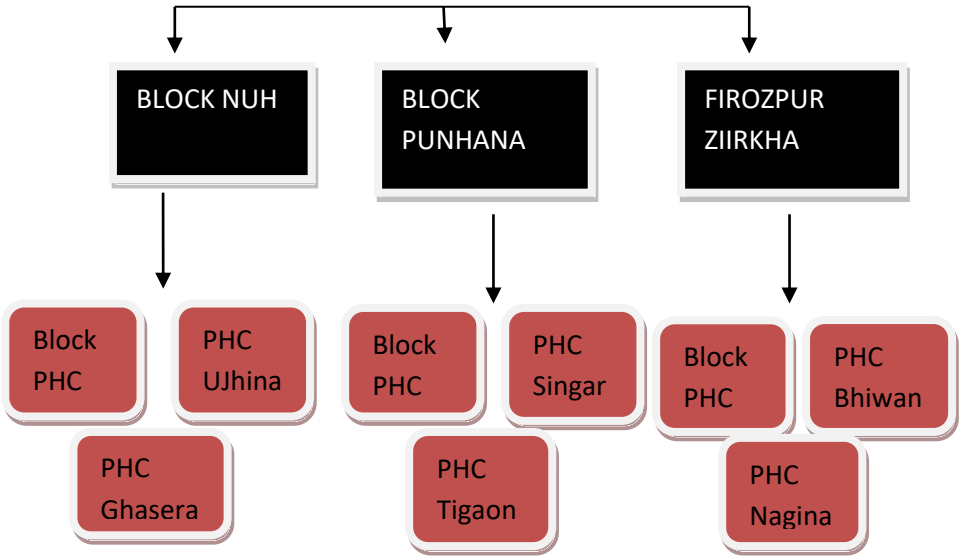
3.1 STUDY AREA- Mewat, Haryana

3.2 STUDY DESIGN- Cross sectional study

3.3 STUDY RESPONDENT- Cold chain handler

3.4 SAMPLE SIZE- 9

3.5 SAMPLING



3.6 DATA COLLECTION TOOLS

- Pre-tested RAPID tool for health facility.
- Knowledge assessment questionnaire for cold chain handler.

3.7 TECHNIQUE-

- Interview
- Review of records/documents- Stock register, temperature log book, vaccine issue register etc.
- For analysis- SPSS version 17, MS Excel.

3.8 EXPECTED OUTCOME-

In the context of study the expected outcome would be the cold chain at facility may be proper as per guidelines and the knowledge of cold chain handler regarding cold chain would be appropriate.

4.0 FINDINGS AND OBSERVATIONS OF THE STUDY

4.1 COLD CHAIN MAINTAINENCE PRACTISES AMONG MEWAT DISTRICT

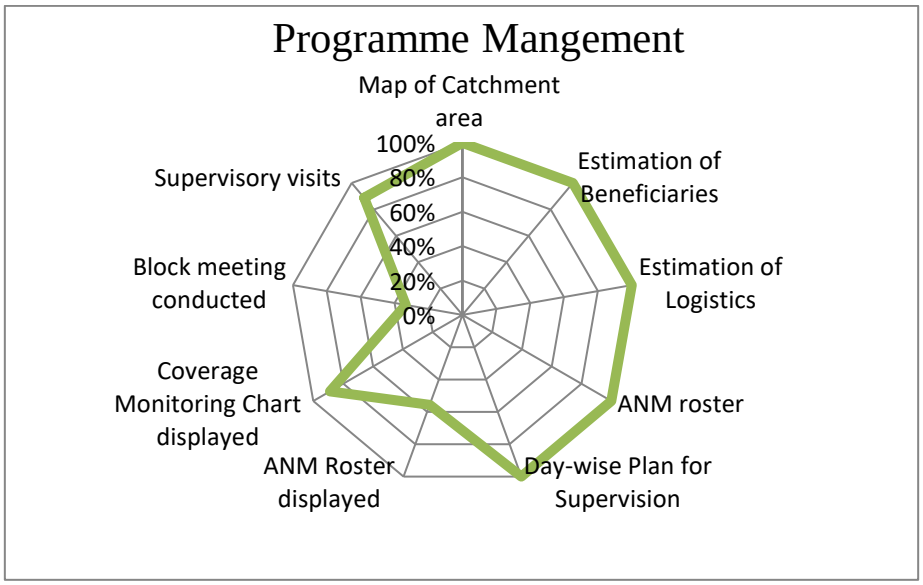


Fig-1

The findings of assessment in form of spider chart (fig-1) shows that component of the facility's RI micro plan availability observed in nine cold chain points, the results were founds Map of catchment area (100%), estimation of beneficiaries (100%), estimation of logistics (100%), ANM roaster or Immunization calendar (100%), Day wise plan for supervision (100%), ANM roaster displayed (58%), Coverage monitoring chats displayed (90%), Block meeting conducted (35%), Supervisory visits (90%).

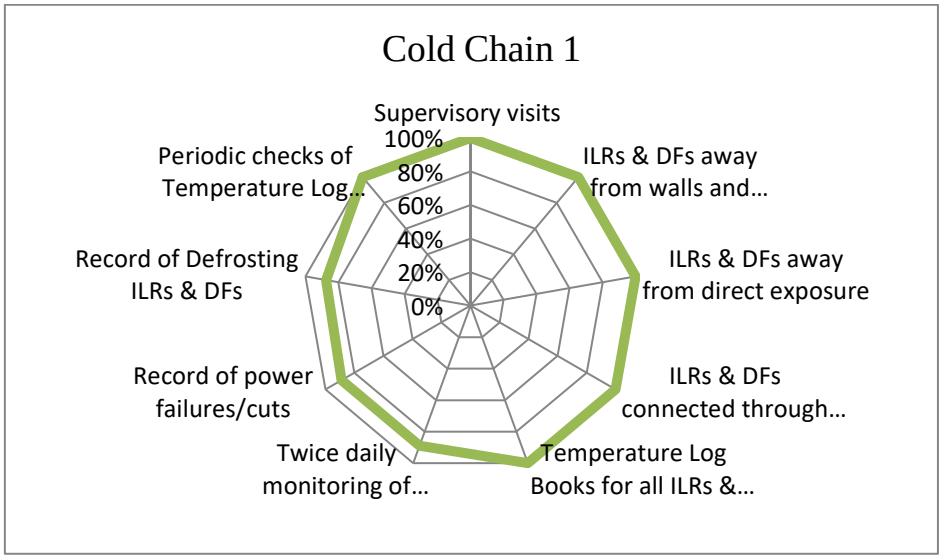


Fig-2

In fig-2 shows that component of correct placement of ILR and DF observed in nine cold chain points were found Supervisory visits (100%), ILR and DFs away from walls and other equipment (100%), ILR & DFs away from direct exposure with sunlight (100%), ILR & DFs connected through stabilizers (100%), Temperature log books for all ILR & DFs (100%), Twice daily monitoring of temperature (90%), Record of power failures/cuts, if it is applicable (90%), Record of defrosting ILR & DFs (85%), Periodic checks of temperature log book (100%).

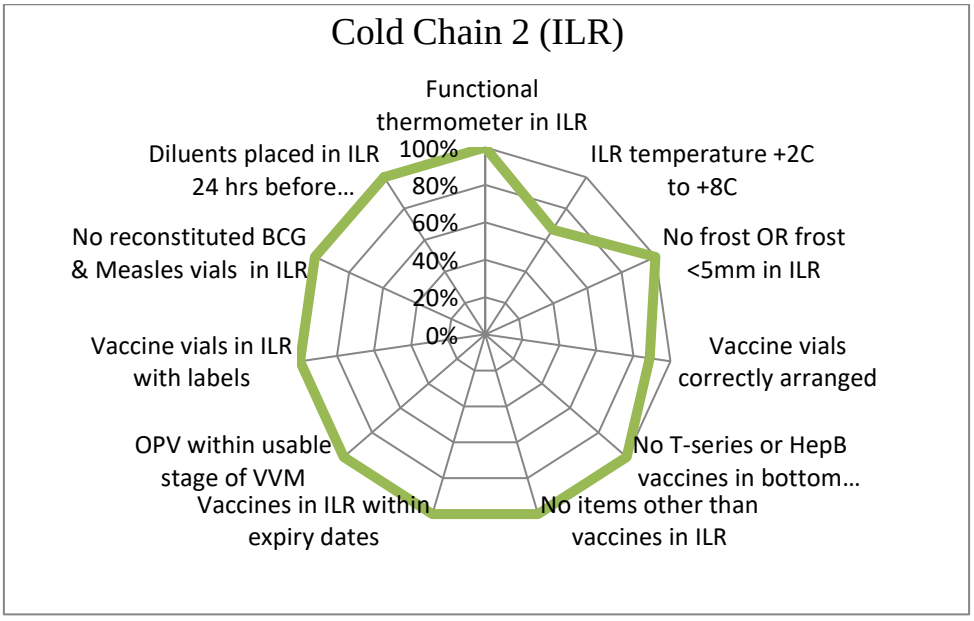


Fig-3

In fig-3 shows that the results of component of ILR observed in nine cold chain points were found Functional thermometer in ILR (100%), ILR temperature +2◦c to +8◦c (65%), No frost or frost less than 5mm in ILR (100%),Vaccines vials correctly arranged in ILR (90%), No T-series or Hep B vaccines in bottom (100%), No items other than vaccines in ILR (100%), Vaccines in ILR with labels (100%), No reconstituted BCG & Measles vials in ILR (100%), Diluents placed in ILR 24 hrs before distribution (100%).

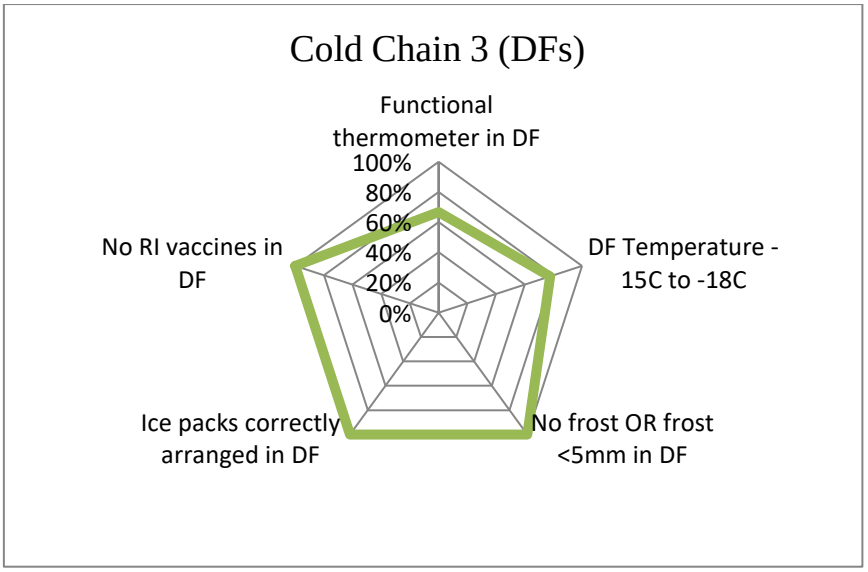


Fig-4

In fig-4 shows that the results of the component of DFs observed in nine cold chain points were found- Functional thermometer in DF (65%), DF temperature -15◦c to -18◦c (78%), No frost or frost less than 5mm in DF(100%),Ice packs correctly arranged in DF (100%), No RI vaccines in DF (100%).

4.2 KNOWLEDGE OF COLD CHAIN HANDLER REGARDING COLD CHAIN IN MEWAT DISTRICT

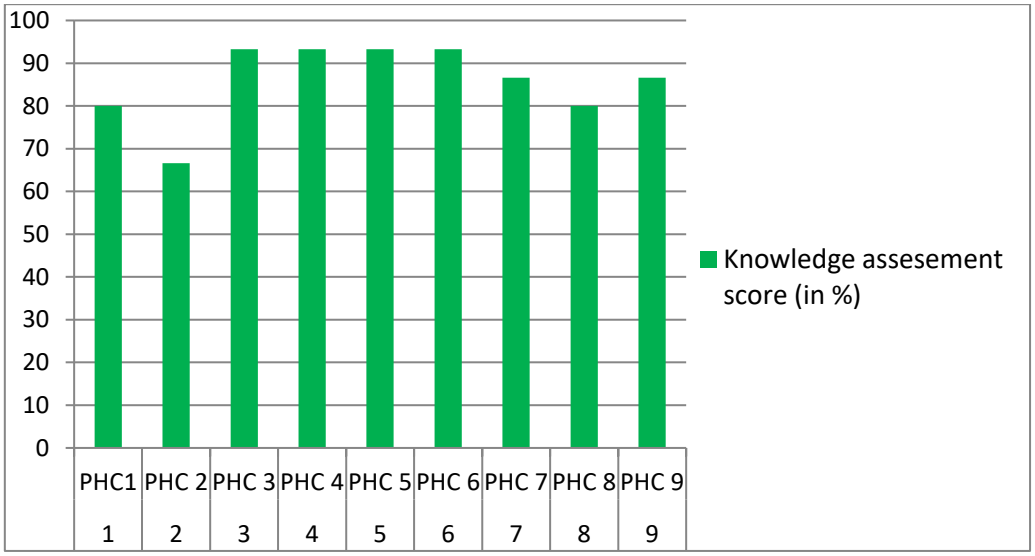


Fig-5

The bar graph of knowledge assessment (fig-5) shows that the results of knowledge status of cold chain handler regarding cold chain maintenance practices, the observation of cold chain handler knowledge were found facility wise – Block PHC-1 Nuh (80%), PHC-2 UJhina(67%), PHC-3 Ghasera (94%), Block PHC-4 Punahana (94%), PHC-5 Singar (94%), PHC-6 Tigaon (94%), Block PHC-7 Firozpur zirkha (86%), PHC-8 Nagina (80%), PHC-9 Bhiwan (86%) .

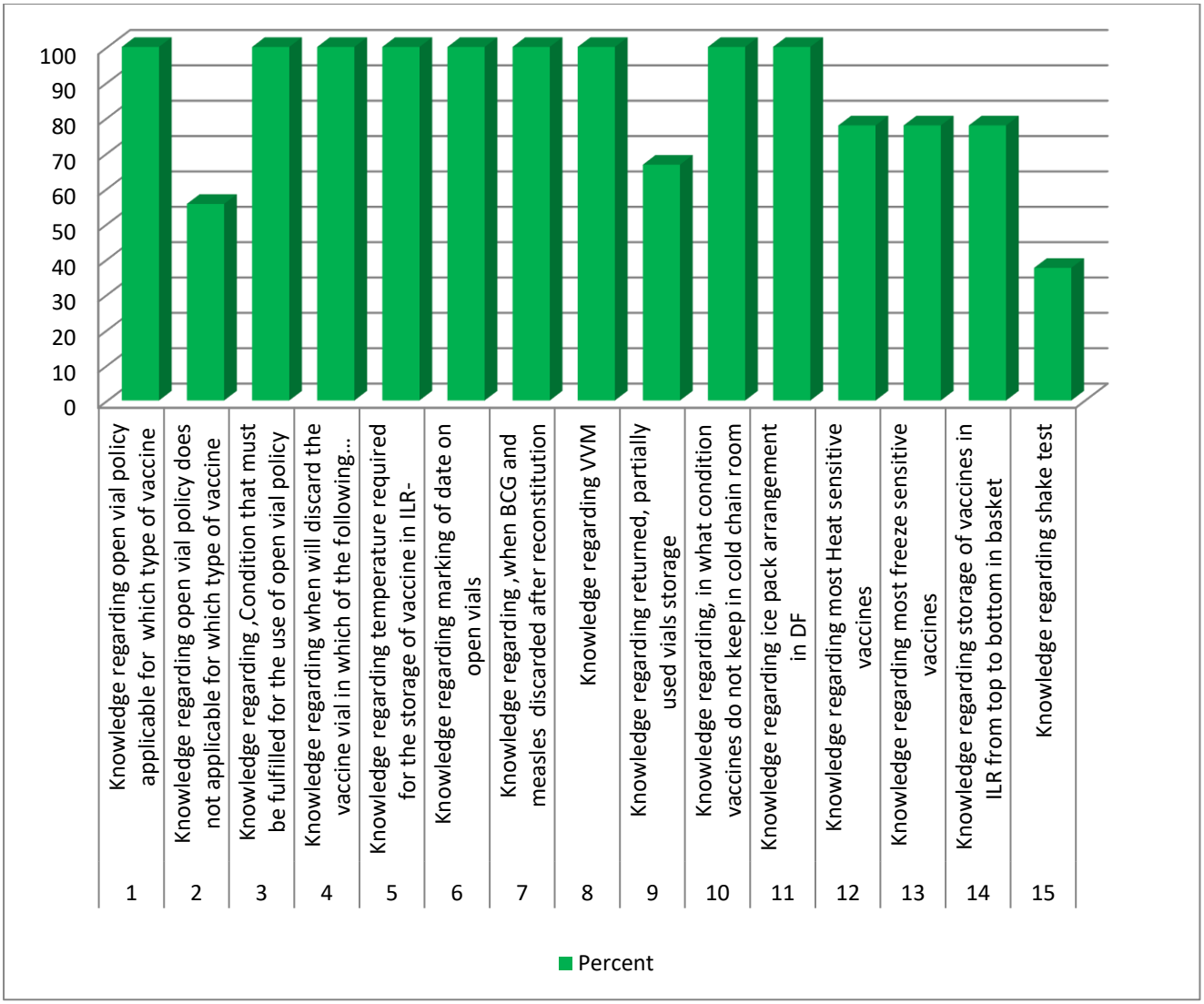


Fig-6

In fig-6 shows the result of knowledge assessment component wise of all nine facilities, the observation were found-Knowledge regarding open vial policy does not applicable for which type of vaccine (100%), Knowledge regarding Condition that must be fulfilled for the use of open vial policy (56%), Knowledge regarding when will discard the vaccine vial in which of the following condition met (100%), Knowledge regarding temperature required for the storage of vaccine in ILR (100%), Knowledge regarding marking of date & time on open vials (100%), Knowledge regarding when BCG and measles discarded after reconstitution (100%), Knowledge regarding VVM (100%),Knowledge regarding returned partially used vials storage (67%), Knowledge regarding -in what condition vaccines do not keep in cold chain room (100%), Knowledge regarding ice pack arrangement in DF (100%), Knowledge regarding most Heat sensitive vaccines (77%), Knowledge regarding most freeze sensitive vaccines

(77%),Knowledge regarding storage of vaccines in ILR from top to bottom in basket (77%), Knowledge regarding shake test (38%).

5.0 DISCUSSION

Cold chain maintenance is an essential activity to maintain the potency of vaccines and to prevent adverse events following immunization. Knowledge is the one of the most important component which reflects on the practices and vice versa.

The potency of vaccines depends on maintaining the cold chain-that is, a prescribed temperature range of 2–8°C during transport and storage. The GOI protocol[11] recommended that each vaccine storage and distribution facility with electrically operated refrigeration equipment has a power generator to secure a reliable source of electricity. Handbook on vaccine and cold chain handler's guidelines[11] by the government of India also recommended that each equipment should be connected to voltage stabilizer with permanently secure plug and socket. Bachani et al reported a shortage of temperature maintenance equipment. Defective stabilizers and electricity plugs and sockets were the reason of breakdown in many cases as reported in Haryana[12]. The present study did not observe any shortage of electrical equipment and all ILR and DF were connected with stabilizer and all were functional as per guideline.

The GOI protocol[11] also recommended that ice-lined refrigerators and deep freezers be supported on wooden blocks and be located at least 10 centimetres away from walls. The present study observed these as (100%) and (100%) respectively.

It was recommended[11] that ice-lined refrigerators and deep freezers would maintain a temperature of 2° to 8° C and 15◦ to 18◦c with twice daily monitoring of temperature in temperature chart book. The present study observed that 65% and 78% cold chain point maintain temperature between 2◦c to 8◦c and 15◦ to 18◦c respectively; twice daily monitoring in temperature log book was 100%. In respective of ILR temperature between +2◦c to +8◦c and DF temperature between -15◦c to -18◦c not maintained in four cold chain point out of nine, this issue arises due to POL issue. The PHC utilized the RKS fund for purchasing POL for the Gen sat, but fund was not adequate. Functional thermometer in DF was not found in four Cold chain

[11] Govt. of India,author.Handbook of vaccine & cold chain handlers, New Delhi: Ministry of health & family welfare.UNICEF,2010

[12] Aggarwal A, Singh AJ. Evaluation of cold chain system in rural areas of Haryana. Indian Pediatr.1995 Jan;32(1):31–34. [Pub Med]

points; but there was twice daily recording of temperature in log book of DF that may be false or used cabinet temperature for recording of temperature in log book.

The other major issues from the programme management of routine immunization component were block meeting not conducted or somewhere conducted but not documented due to this directly reflect in the graph as only (35%) documented.

The cold chain handler facility wise overall knowledge Assessment average score was found (86%) that was good. Ashish K. Naik[13] (et al) study conducted in 20 UHCs of Surat Municipal Corporation (SMC) reported that knowledge about shake test was found 40%. In present study the knowledge regarding shake test was found 38%. Out of nine cold chain points only three cold chain handlers knows about shake test properly, remaining cold chain handler knowledge were poor and inadequate regarding shake test.

6.0 CONCLUSION

The present cold chain status of Mewat district had substantially improved after three round of RAPID. The government protocol recommended for cold chain maintenance practices that was followed completely in Mewat district in respect with components like all ILR & DFs placed on block, ILR and DFs at least 10cm away from walls and surrounding equipments, ILR and DFs away from direct exposure to sunlight/moisture, All ILR and DFs connected through functional voltage separately, Functional thermometer placed inside ILR, No frost or frost less than 5 mm on inside wall of every ILR, All vaccine vials correctly arranged inside labelled cartons, No freeze sensitive vaccine vials placed in the bottom of ILR, No items other than vaccines placed in ILR, vaccines in ILR within expiry date, all vials within usable stage of VVM, vaccines vials in ILR with labels, No reconstituted BCG & Measles vials, Diluents placed in ILR, at least 24 hours before distribution, No frost less than 5mm on inside wall of every DF, correct placement of ice packs inside DF, No RI vaccines stored inside DFs. The cold chain handler facility wise overall knowledge Assessment average score 86% was good but still there is improvement needed regarding shake test, open vial policy, freeze sensitive vaccine and heat sensitive vaccine which is essential component regarding maintenance of potency of vaccine during storage.

[13] Ashish K. Naik (et al), Dept of Community Medicine , Surat Municipal Institute of Medical Education and Research , Surat , Gujarat (Dec 2013)- Evaluation of Vaccine Cold Chain in Urban Health Centres of Municipal Corporation of the Surat City, Western India

7.0 RECOMMENDATIONS

The recommendations related to study and from general observation listed below with issues-

S.No.	ISSUES	RECOMMENDATIONS	KEY PERSON RESPONSIBLE
1	Block meeting was conducted but not documented	Ensure the conduction of block meeting by district officials. Block meeting should be documentated in register with date and minutes of meeting.	DIO/CMO MO/SMO
2	ANM roster/ immunization calendar not displayed at the facility.	MOIC Should inform about it and ensure the availability and display of ANM roster.	MOIC
3	Coverage monitoring Chat not displayed at the facility	Ensure the availability and display of coverage monitoring chart at the facility.	MOIC
4	Open vial of hepatitis B vaccine in ILR was found expired. (After opening of Vial exceed the 28 days of usable limits)	Strict & regular supervision by MOIC. Regular follow up visit by district officials need to be done.	CMO/DIO/MOIC

5	Stock register for vaccines was not being properly maintained and up to date.	Block and district officials should check the updation & maintenance of stock register.	DIO/SMO/MOIC
6	Broken vials of hepatitis and measles were found in ILR	Cold chain handler ensures the care about the handling of vaccines and store properly.	Cold chain handler/MOIC
7	Thermometer for DF not available still there is twice recording of temperature in log book.	MOIC should ensure the availability of thermometer and check the twice daily recording of temp. in log book.	MOIC
8	Open vial policy not being properly followed	Permanent marker should recommend to ANM to mark date on open vial vaccine.	Cold chain handler
9	Need improvement in temperature recording practices	Twice daily recording of temperature, record of power failure and defrosting to be maintained, MOIC counter sign log book	MOIC/ Cold Chain handler

10	Cold chain equipments of Bhiwan placed in Firozpur zirkha(block) facility which needs to be transfer back to bhiwan PHC.	District official should ensure the Bhiwan cold chain equipments placed in Firozpur zirkha block facility that should be transfer back to Bhiwan PHC.(ensure the availability of separate cold chain room at bhiwan PHC)	CMO/DIO/SMO
11	Knowledge regards open vial policy and shake test needs to be improved	MOIC or district officials make arrangement of refresher training regarding knowledge of open vial policy and shake test.	CMO/DIO

8.0 REFERENCES

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9.0 ANNEXURE

9.1 KNOWLEDGE ASSESSMENT QUESTIONNAIRE REGARDING COLD CHAIN HANDLING FOR COLD CHAIN HANDLER

Respected Sir/Madam

I am a Coordinator child health (NHM, Haryana). As a part of my dissertation I am assessing the knowledge of cold chain handler regarding cold chain maintenance practice. So, I request you to spare some of your precious time for this.

- All respondents will be kept strictly confidential. Complete survey will be used for data entry & analysis
- No individual data or responses will be reported. Please give your honest opinion for each question.

Thank you for sparing your valuable time.

Experience: …….. Designation: …….. Training status: ……

When was the last training attended: ……

Accessibility: (0-40 km/ 40- 80 km/ above 80 km)……

No. of supervisory visits in last 6 months: ……

Presence of Urban Nodal officer: ……

Presence of DIO: ……

1. Open vial policy applicable for which vaccine
    a. Pentavalent ☐
    b. Measles ☐
    c. BCG ☐
    d. JE ☐

2. Open vial policy does not applicable for
    a. T-series vaccine ☐
    b. Reconstituted vaccine ☐
    c. JE only ☐
    d. BCG only ☐

3. Condition that must be fulfilled for the use of open vial policy-
    a. The expiry date has not passed. ☐

b. The vaccines are stored under appropriate cold chain conditions both during transportations and storage in cold chain storage point ☐
c. The vaccine vial monitor (VVM), has not reached the discard point. ☐
d. All of the above ☐

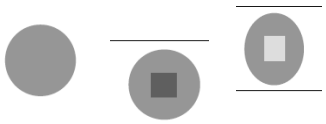
4. When will discard the vaccine vial in any of the following condition met-
   a. If expiry date has passed ☐
   b. If vaccine vial is frozen or contains floccules. ☐
   c. No label or partially torn label or writing on label is not legible ☐
   d. All of the above ☐

5. What is the temperature required for the storage of vaccine in ILR-
   a. -15 to -20◦c ☐
   b. +2 to +8◦c ☐
   C. +15 to 8◦c ☐
   D.None of the above ☐

6. All vaccine vial must be marked when opening at first use-
   a. Record date of vaccine vial opening ☐
   b.Record of time of vaccine vial opening ☐
   C. (a) and (b) both ☐
   d.None of the above ☐

7. BCG and measles discarded after reconstitution
   a. Within 24 hours ☐
   b. Within 12 hours ☐
   C.Within 2 hours ☐
   d.Within 4 hours ☐

8. In which condition vaccine can be used-



a. ☐ b. ☐ c. ☐ d. Both (a) and (b) ☐

9. Returned, partially used vials ……
   a. Kept in cold chain box ☐
   B.Kept in separate zipper lock bag / separate box and labelled it accordingly. ☐
   C.Kept in vaccine carrier box ☐
   d. kept in refrigerator ☐

10. In what condition vaccines do not keep in cold chain room?

a) Any vials that are expired ☐
b) Frozen or with VVMs beyond the discard point ☐
c) Both of the above ☐
d) None of the above ☐

11. Ice pack arrangement in DF

a) Criss cross arrangement ☐
b) Normal arrangement ☐
c) Fully packed arrangement ☐
d) None of the above ☐

12. Most Heat sensitive vaccines

a) BCG(after reconstitution), OPV,Measles (Both after and before constitution) ☐
b) DPT,TT,DT and HepB ☐
c) BCG(before reconstitution) and Hep B ☐
d) All of the above ☐

13. Most freeze sensitive vaccines

a) OPV and BCG ☐
b) Hep B and DPT ☐
c) Measles and BCG ☐
d) None of the above ☐

14. Storage of vaccines in ILR from top to bottom in basket

a) HepB,LPV,TT,BCG,OPV ☐
b) OPV,BCG,TT,HepB ☐
c) Measles,OPV,LPV ☐
d) Both (a) and (c) ☐

15. What is shake test?

- Three vial used for performing shake test-Frozen test vial, frozen control vial, non frozen test vial
- Step-1 Freeze a vial until it is solid; this will be your control vial-call it “FROZEN.”
- Step-2 Allow Frozen vial to thaw completely
- Step-3 Select one sample of each vaccine you suspect has been frozen-call it “SUSPECT.”
- Step-4 Shake FROZEN and SUSPECT vials.
- Step-5 Observe FROZEN and SUSPECT vials side by side to compare how they sediment (5-15 minutes)
- If SUSPECT vial sediments slower than FROZEN control vial. Test vial has not been damaged and can be used.
- If SUSPECT vial sediments at the same rate as or faster than FROZEN control vial. Test vial damaged and cannot be used.

9.2 RAPID CHECKLIST –HEALTH FACILITY

Name of Block/Planning Unit : _____ Name of Health Facility : _____
Date of Visit : ___/___/_____ Population covered : _____ Name of Monitor/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	Block meeting conducted with RI component with Health/ICDS/ PRI in last calendar month *(verify minutes)*	Yes ☐ No ☐
5	Supervisory visits with RI component by District level Government Health officials in the last calendar month	Yes ☐ No ☐
	COLD CHAIN *(Observe in Cold Chain Room)*	
6	Correct placement of each ILR and DF	
	a. All ILRs & DFs placed on blocks (e.g. wooden/plastic)	Yes ☐ No ☐
	b. All ILRs & DFs at least 10 cm away from walls and surrounding equipment	Yes ☐ No ☐
	c. All ILRs & DFs away from direct exposure to sunlight, moisture and rain	Yes ☐ No ☐
	d. All ILRs & DFs connected through functional Voltage Stabilizers	Yes ☐ No ☐
7	Temperature Log Books	
	a. Temperature Log Books available for every ILR and DF	Yes ☐ No ☐
	b. Twice daily monitoring of temperature in respective log books	Yes ☐ No ☐
	c. Record of power failures/cuts (if any)	Yes ☐ No ☐
	d. Record of Defrosting ILRs & DFs	Yes ☐ No ☐
	e. Periodic checks of Temperature Log Books by Facility in-charge (see evidence of signatures)	Yes ☐ No ☐
8	Ice Lined Refrigerator (ILR)	
	a. Functional thermometer placed inside every ILR	Yes ☐ No ☐
	b. Cabinet Temperature of ILRs between +2 to +8OC	Yes ☐ No ☐
	c. No frost OR frost less than 5mm on inside walls of every ILR	Yes ☐ No ☐
	d. All vaccine vials correctly arranged inside labeled cartons (expiry date, batch)	Yes ☐ No ☐
	e. No T-series or Hepatitis B vaccine vials placed in the bottom of ILR	Yes ☐ No ☐
	f. No items other than vaccines placed inside ILR	Yes ☐ No ☐
	g. Vaccines in ILR within expiry dates (check a few vials)	Yes ☐ No ☐
	h. OPV vials within usable stage of VVM (check a few vials)	Yes ☐ No ☐
	i. Vaccine vials in ILR with labels (check a few vials)	Yes ☐ No ☐
	j. No reconstituted BCG & Measles vials	Yes ☐ No ☐
	k. Diluents placed in ILR, at least 24 hours before distribution (observe and/or consult)	Yes ☐ No ☐
9	Deep Freezer (DF)	
	a. Functional thermometer placed inside every DF	Yes ☐ No ☐
	b. Cabinet Temperature of DFs between -15 to -18OC	Yes ☐ No ☐
	c. No frost OR frost less than 5mm on inside walls of every DF	Yes ☐ No ☐
	d. Correct placement of ice packs inside DF (in crisscross manner, while freezing)	Yes ☐ No ☐
	e. No RI vaccines stored inside DFs (including reconstituted vaccines)	Yes ☐ No ☐

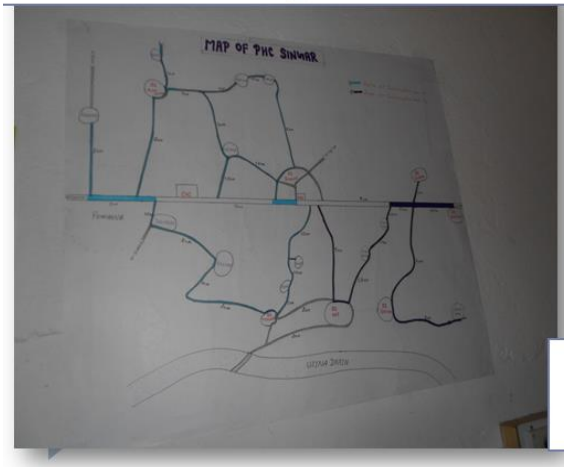
SUPPLIES AND STOCKS *(Physically count in cold chain room and then consult stock registers)*

		Actual count	Record		Actual count	Record
10	a. DPT vaccine (in vials)			f. BCG vaccine (in vials)		
	b. DT vaccine (in vials)			g. Hepatitis B vaccine (in vials)		
	c. TT vaccine (in vials)			h. BCG Diluent (ampoules)		
	d. OPV vaccine (in vials)			i. Measles Diluent (ampoules)		
	e. Measles vaccine (in vials)					

9.3 PHOTOS

Good Practices observed

Map of the PHC with distances from the cold chain point



Contingency plan for cold chain displayed

Well IEC DISPLAYED IN COLD CHAIN ROOM

Stabilizer placed at the Platform at eye level

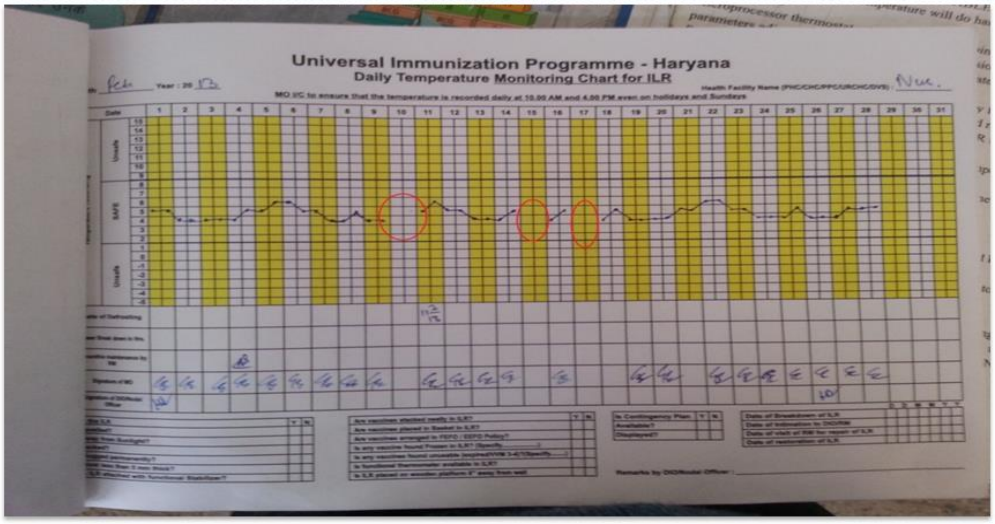
Open vials placed in ILR with zipper lock bag with tagging of ANM Name

Criss cross pattern on icepacks

Dots, Date & Name of ANM mentioned for implementing open vial policy for LPV

PRACTICES REQUIRING IMPROVEMENT

Open Hepatitis vaccine in ILR without date



Daily Monitoring of Temperature Log Books not being done, no record of defrosting, power cuts