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Evaluation, awareness, practice and management of cold chain at the primary health care centres of Ahmedabad & Gandhinagar Districts

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Abstract

Background: The success of immunization depends highly on the level of cold chain maintenance. The aim of the study was to assess the condition of cold chain equipment, practices adopted for cold chain maintenance and knowledge of the health care personnel.

Materials and Methods: It was a cross-sectional study conducted in 15 PHCs of Ahmedabad and Gandhinagar Districts. Cold chain equipment 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. Simple proportions were calculated.

Results: Ice lined refrigerators and deep freezers were available in all PHCs. Dial thermometer was present in all the centres. Cold boxes, frozen packs and automated voltage stabilizers were available in 14(93.3%) centres. Improper vaccine storage was observed in 2 (13.3%) centres. Majority of medical officers & persons who are looking after cold chain had knowledge and correct practices in fields like ideal equipment, vaccine requiring diluents but only 10 (66.6%) medical officers had correct practice of defrosting the deep freezers & knowledge about temperature of deep freezer.

Conclusion: The availability of equipment is near universal. Improper vaccine storage practices and poor knowledge in some fields of cold chain management may adversely affect the quality of administered vaccine. Relevant training for those handling the cold chain is recommended.

Keywords: Cold Chain, Primary health center (PHC)

1. Introduction

Vaccine preventable diseases like polio, measles, and hepatitis are major causes of morbidity and mortality among children in developing countries. Vaccination is one of the most effective disease prevention strategies when implemented properly across all sections of the at-risk population. Immunization against a disease is achieved only if a potent vaccine is administered.

Cold chain maintenance is a term defined as the materials, equipment and procedures used to maintain temperatures between +2ºC to +8ºC while in transit throughout the distribution and storage process for vaccines from the manufacture point up to the beneficiary; where as cold chain also includes the people i.e. health workers engaged to maintain the equipment and temperature at peripheral levels. Vaccine potency once lost cannot be restored. The cold chain remains a highly vulnerable point for both National Immunization Programs and office practice in developing countries with tropical climates.

At the end of the chain, primary health care providers must have adequate knowledge to manage the cold chain. Several reports from developing countries indicate that health workers seem to be overwhelmingly concerned with only raising vaccination coverage. The quality of vaccination services that is equally important for achievement of the ultimate goal of disease reduction has been neglected. Suboptimal seroconversion rates and outbreaks of vaccine preventable diseases elsewhere were attributed to loss of vaccine potency either during transportation or storage.

The objective of this study was therefore to assess the cold chain at primary health centers (PHC). Another objective was to assess the awareness and skills of cold chain handlers about basics of cold chain maintenance to understand the gap in cold chain management.

2. Material and method

It was a cross-sectional study conducted in 15 PHCs of Ahmedabad and Gandhinagar Districts. Cold chain equipment 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. Simple proportions were calculated.

The evaluation instrument included information on demographics, electrically powered vaccine storage equipment (e.g., ice-lined refrigerators, deep freezers); non-electrical vaccine storage equipment (e.g., cold box, vaccine carriers); icepacks, power generators and temperature monitoring charts; assessment of the set-up and maintenance of electrical equipment. The questionnaire included questions on background information of the respondents and more specific ones related to knowledge regarding management of the cold chain including the recommended storage temperature range, immunization schedules, use of diluents, storage in the deep freezers, measures to be taken in the event of power failure, the shake test and the effects of freezing vaccines.

3. Result

Fifteen PHCs of the study area were visited and facilities for

vaccine storage like ice lined refrigerator and deep freezers and facilities for vaccine transport like vaccine carriers and cold boxes etc., were inspected. In addition temperature monitoring related issues was also noted.

Table 1 shows availability of infrastructure. It shows that most infrastructure was available in all PHCs. Backup generator was available in only 8 PHCs. We can say that infrastructure in not a major problem. Table 2 and 3 shows whether guidelines for cold chain are followed or not. Table 4 shows the knowledge and awareness of a health care personnel who maintains cold chain.

Table 1: availability of cold chain equipments

parameter	Available (%)	Not available (%)	Not working (%)
Deep freezer & Ice lined refrigerator	15 (100)	0	0
Cold box	14 (93.3)	1 (6.7)	0
Vaccine carrier	15 (100)	0	0
Functional voltage stabilizer	14 (93.3)	0	1 (6.7)
Plug & socket	15 (100)	0	0
Backup generator	8 (53.3)	4 (26.6)	3 (20)

Table 2: exterior of cold chain equipments

Exterior of equipments	Yes (%)	No (%)
Clean, not rusted	15 (100)	0
Placed over wooden platform	13 (86.6)	2 (13.4)
10 cm away from wall	13 (86.6)	2 (13.4)
Cold chain room separate & adequate	14 (93.3)	1 (6.6)
Stock security maintained	13 (86.6)	2 (13.4)
Display of charts	12 (80)	3 (20)

Table 3: interior of cold chain equipments

parameter	Yes (%)	No (%)
Anything other than vaccines or diluents kept	2 (13.4)	13 (86.6)
Different vaccines not kept in different boxes	3 (20)	12 (80)
Lack of proper arrangement of vaccines	2 (13.4)	13 (86.6)
T series & HB vaccines touching wall of ILR	1 (6.7)	14 (93.3)
Presence of expired vaccine	3 (20)	12 (80)
Presence of stage 3 & 4 vaccine	3 (20)	12 (80)
Presence of frozen vaccine	3 (20)	12 (80)

Table 4: knowledge and awareness regarding cold chain

Parameters	Know (%)	Don't know (%)
Could name all heat sensitive vaccines	10 (66.6)	5 (33.3)
Could name all cold sensitive vaccines	11 (73.3)	4 (26.6)
Correct demonstration of temperature reading	13 (86.6)	2 (13.4)
Correct placing thermometer inside deep freezer & ILR	14 (93.3)	1 (6.7)
Temperature monitoring on holiday	10 (66.6)	5 (33.3)
Preventive maintenance every month fixed day	13 (86.6)	2 (13.4)
Correct interpretation of VVM & shake test	9 (60)	6 (40)

4. Discussion and conclusion

The cold chain still remains a highly vulnerable element of any immunization programme, both in developing and developed countries Careful attention to storage and handling is essential to ensure optimal potency of vaccines and to maximize the resulting efficacy of vaccination. In India many studies have been conducted to assess the knowledge of health workers about vaccine vial monitor. Studies assessing the knowledge and practice in various aspects of vaccine storage, administration are limited.

Our study shows that availability of infrastructure is not a major problem in maintaining cold chain. When it comes to following guidelines, there is something we can do more. There was presence of expired vaccines in 3 PHCs. There was presence of stage 3 and 4 stage vaccines and frozen vaccines in 3 different PHCs. Some loop holes were found in maintaining proper exterior of equipments. In some PHCs display of temperature charts were not regular. In some PHCs equipments were not placed 10 cm away from wall. Deficient knowledge and awareness in health care personnel is a major issue. Some of them could not correctly interpret VVM and shake test.

The availability of equipment is near universal in the present study. However the poor knowledge, for example, about the effect of freezing some vaccines, the shake test, the correct storage temperature range, steps in case of power failure and the observed inadequate vaccine storage practices, potentially may adversely affect the quality of the administered vaccines opening spaces for epidemics due to vaccine preventable diseases. We therefore recommend continuous training and supportive supervision as the key measures to address the findings of this study.

5. References

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