Original Research Article

Assessment of Vaccine storage Practices in 2 districts of Eastern India -Using Global Assessment tool

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Abstract

Background: Introduction of EPI was to accelerate disease control efforts and outcomes.EPIs are typically governed by Ministries of Health in cooperation with the WHO , UNICEF to provide technical assistance in planning, social mobilization , reach vaccine-specific target immunization coverage rates and reduce incidence of VPDs. The WHO recommendation on immunization schedules is to ensure proper administration of vaccines to each age-specific target group. Effective program should reach target population at right time, right place and right condition before patients are exposed to infectious diseases. The first VMAT assessment of India was undertaken by Odisha in December 2007.**Objectives:** 1.To gather information on vaccine storage temperature and wet and dry storage capacity in the facility. 2.To assess the vaccine storage practices.3.To suggest recommendations. **Methods: Place of the study:** DVS and CCPs in Cuttack and Jagatsinghpur ,**Type of study**: cross-sectional, **Study design**: By simple random sampling 7 CCPs in Cuttack district and 3 CCPs in Jagatsinghpur district were selected and 2 DVSs were included, **Period of Study:**Nov 2018 to Oct 2019, **Study instrument:** Global assessment tool designed by WHO, **Ethical consideration:** Obtained from IEC of S.C.B Medical College **Results**: The vaccines were arranged properly from bottom upwards as recommended by WHO and the vaccines stored were within expiry period and having usable stage VVM. No reconstituted BCG, Measles or JE vaccines were found in any equipment in both the districts. **Conclusion**:In all the CCPs in this study the vaccines were arranged properly from bottom towards upwards as recommended by WHO. No reconstituted BCG, Measles or JE vaccines were found in any equipment in both the districts. Opened vials were stored in 87.5 % and 75% of facilities in both districts separately.

Key words: VPD, EPI, VMAT.

Introduction

Over the past decade, the world has invested enormous resources and energy into the development of new and lifesaving vaccines. With the availability and accessibility of new and costly vaccines under the programme, the new challenge is to ensure a seamless supply chain system.

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With high stock values and greater storage capacity at every level of the cold chain system, managers must be able to maintain optimal stock levels, reduce wastage, accurately forecast ,vaccine requirements, and prevent equipment break-downs or malfunctions. Maintaining high standards of performance in these areas can only be achieved if all the links in the vaccine supply chain are effectively monitored, assessed and improved based on the gaps identified[1-5].The cold chain is the system of transporting and storing vaccines at a specific recommended temperature as per the national vaccine storage guidelines. The vaccine cold chain begins with the cold storage unit at the vaccine manufacturing

plants and extends through the transport of vaccine to the distributor, then the delivery provider and ends with the administration of the vaccine to the patient[5].A vaccine must have two characteristics, one is safety and the other is potency. Vaccines lose their potency if they are not stored or transported at an appropriate temperature range. Once the potency is lost, it cannot be regained. The damaged vaccine must be destroyed. This leads to inadequate stock and wastage of expensive vaccines. Furthermore, children who receive vaccines that are not potent will not be protected from diseases[6].A study conducted in eight health districts in Cameroon revealed that the targeted health districts were not compliant with the standard operating procedures. Almost 25% of health facilities were conducting EPI activities without cold chain equipment resulting in a threat to the cold chain for vaccine[7]. Vaccines have been proven to be a cost-effective medical intervention in the prevention of disease. The rates at which vaccines have been successful in eradicating and reducing the occurrence of some of the most prevalent diseases in the United States is well understood from the fact that reduction of small pox, measles, Rubella and Mumps was by 100% over a period of 100 years, Diphtheria reduced by 99.99% over 80 years, measles reduced by 99.99 over 60 years and mumps by 99.75 years over a period of only 9 yeas[8].

Global vaccine development has expanded in the last decade, providing countries with new and more effective vaccines and technologies to combat the spread of infectious diseases.

While these advancements have enormous potential, their protective benefits can only be realized if there are effective ways of delivering vaccines to the people who need them. The coordination of personnel, cold chain equipment, vehicle fleets, information systems and activities seamlessly integrated with vaccine program and financial planning, forecasting, and production and procurement processes is essential. Without proper management and planning of these activities vaccines could not be delivered to the people who need them at the right time, place and in the right condition, increasing their risks for life-threatening diseases[9].

Methods

After taking permission from the Chief District Medical and Public Health Officer (CDM & PHO) of both the districts the study was conducted in the various facilities of these districts.After reaching the facility, the purpose of the study was well explained to the Medical Officer and the staffs of the CCPs by the investigator himself. The parts of the global assessment tool was also explained in simple language to the staffs of the CCP. Thereafter the details of the assessment of the CCP and Vaccine Management was carried out under various heading like manpower, training, knowledge of the staffs regarding vaccine management. Various records of the cold chain point including the temperature log book, stock register, were checked and verified by the investigator himself.

Data entry and analysis: The data obtained as per the global assessment tool was coded with the to ensure quality of the scientific research. The coded data were entered in the statistical software SPSS (version 21), analysed, and interpreted.

Results

Table 1: Institutions visited for the study

Sl no	Institutions	Cuttack	Jagatsingpur
1	DVS	1	1
2	Other facilities	7	3
	Total	8	4

Table 1 shows that both the District Vaccine Stores were taken in the study. 12 facilities (8 in Cuttack district and 4 in Jagatsinghpur district) are included.

Table 2: **Comparison of Dry storage capacity of the cold chain points in Cuttack & Jagatsinghpur Districts**

Dry storage capacity (vol. in M^3)	Cuttack district	Jagatsinghpur district	Significance
DVS	98.05 (21.2%)	108.8 (33.7%)	Chi Square
Other cold chain points	364.14 (78.8%)	214.02 (66.3%)	(X^2)
Total	462.19 (100%)	322.82 (100%)	=15.381, df=1,*P*< 0.001

As depicted in Table 2 dry storage capacity for vaccines and other logistics (in cubic meter) of the DVS Cuttack was only 21.2% of the total which was found to be less in comparison to that of Jagatsinghpur district (33.7% of total) and this difference in the dry storage volume(in cubic meter) was also found statistically significant (p<0.001)

Table 3: Comparison of Wet storage capacity of the cold chain points in Cuttack & Jagatsinghpur District

Volume of cold chain equipments in different facilities in litres	Cuttack district	Jagatsinghpur district	Significance
DVS	1032 (27%)	2176 (63.8%)	Chi Square (X^2) = 991.01, df=1, *P*< 0.001
Other cold chain points	2808 (73%)	1236 (36.2%)	
Total	3840 (100%)	3412 (100%)	

Table 3shows that Volume of cold chain equipments in different facilities in litres of DVS Jagatsingpur and which contributed to 63.8% of the total district, whereas that of DVS Cuttack was proportionately very less i.e., only 27% of the total volume. It is concluded that, other cold chain points of Cuttack district had proportionately more in volume of the cold chain equipments than that of Jagatsinghpur district and this difference was statistically highly significant.

Table 4: Status of vaccine storage practices

Parameters	Cuttack (N=8)	Jagatsinghpur (N=4)
Vaccines correctly arranged from bottom towards upwards	8(100%)	4(100%)
Vaccines stored are within expiry dates	8(100%)	4(100%)
VVM status of stored vaccines is in usable stage	8(100%)	4(100%)
Reconstituted BCG, Measles or JE vaccines found	0	0
Items other than vaccines and diluents found	0	0
Opened vial of any vaccine stored inside ILR	8(100%)	4(100%)
If yes, are they stored separately	7(87.5%)	3(75%)
Are these returned unused vials distributed on priority on next session Day	6(75%)	2(50%)
Stock register update till last session Day	4(50%)	1(25%)

Table 4 shows that 100% of vaccines stored are within expiry date and having usable VVM status both in Cuttack and Jagatsinghpur districts.

Table 5: Contingency plan on availability and proper positioning

Sl no	Cuttack (N=8)			Jagatsinghpur (N=4)		
	Available and placed properly	Available but not placed properly	Absent	Available and placed properly	Available but not placed properly	Absent
1	5 (62.5 %)	2(25 %)	1(12.5%)	2 (50 %)	1(25%)	1(25 %)

7 facilities of Cuttack district is having contingency plan out of which in 5 (62.5 %) facilities it was placed properly, and in 2 (25 %) facilities though it was present but not placed properly. In one facility in Cuttack district there was no contingency plan at all.However in Jagatsinghpur district, contingency plan was present in 3 facilities out of which in 2 (50 %) facilities it was placed properly, and in 1 (25%) facility it was not placed properly. In one facility in Jagatsinghpur district there was no contingency plan at all. (Table 5)

Discussion

Dry storage capacity for vaccines and other logistics in cmm of DVS Cuttack was only 21.2% of the total which was found to be less in comparison to that of Jagatsinghpur district.Volume of cold chain equipments in different facilities in litres of DVS Jagatsingpur contributed to 63.8% of the total district, whereas DVS Cuttack was proportionately very less i.e., only 27% of the total volume.Table IV shows the status of vaccine storage practices in different facilities of Cuttack and Jagatsinghpur districts. It was found that 100% of vaccines stored

were within expiry date and having usable VVM status in both districts.Pandey S et al[10] in 2018 in Bihar found 85.7 % facilities having stored vaccines with usable VVM status. Similar results were found by Krisnhnappa L et al[11] and Nandan D et al[12] in 2009.No reconstituted BCG, Measles or JE vaccines were found in any of the ILRs. Similar results were found by Pandey S et al[10] in 2018 and Gupta P et al[13]. In this study 87.5 % and 75 % of facilities found to store opened vials in separate basket in the ILRs. In a study by Pandey S et al 85.7 % facilities stored the opened vials in separate basket in the ILR[10]. Contingency plan is a concise display chart which shows important contact information in case of emergencies.Table V showed 7 facilities of Cuttack district having contingency plan out of which in 5 (62.5 %) facilities it was placed properly, and in 2 (25 %) facilities though it was present but not placed properly. Similarly in Jagatsinghpur district, the contingency plan was present in 3 facilities out of which in 2 (50 %) facilities it was placed properly, and in 1 (25%) facility it was not placed properly. Similar study by Chourasia S et al[14] found the contingency plan was absent in 23% facilities in Jhabua district of Madhya Pradesh.Another by Mendhe H et al[15] in Bilaspur district of Chhattisgarh found in 63.3 % facilities the contingency plan was displayed properly.National EVM assessment 2018 data shows the emergency contact details not posted in 24 % of stores and 15 % staffs don't know what to do in case of emergency[15].

Conclusion

- In all the CCPs in this study the vaccines were arranged properly from bottom towards upwards as recommended by WHO
- No reconstituted BCG, Measles or JE vaccines were found in any equipment in both the districts
- Opened vials were stored in 87.5 % and 75% of facilities in both districts separately
- Stock register was updated till last session day in 50 % and 25 % of facilities in both districts
- Contingency plan was available and placed properly in 62.5 % and 50 % of facilities of Cuttack and Jagatsinghpur districts respectively.

Recommendations

- Separate dry storage area should be provided to all the cold chain points for storage of dry consumables.
- Internet facility with a computer assistant should be made available for time to time updatation of the stock of vaccines and consumables and for online indentation of vaccines.
- Training of Medical Officers on supportive supervision of the cold chain points should be done and reviewed on a monthly basis by the district authorities.

Limitations

This study was conducted in a limited number of facilities of both Cuttack and Jagatsinghpur district. A larger multi centric approach is needed for better evaluation of effective vaccine management.

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