Knowledge and Practice of ANMs regarding Cold Chain Management for Different Categories of Vaccines

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Abstract

A cold chain is a temperature-controlled supply chain. An unbroken cold chain is an uninterrupted series of storage and distribution activities which maintains a given temperature chain. It can be managed by the Quality Management System. It analyses, measures, controls, documents the supply of vaccines to the reaching point. As a cold chain handler ANMs play an important role in improving the immunisation coverage. In a study, Samant Y, et al (2007) revealed weaknesses in the cold chain mechanism. Cold chain for the oral polio vaccine (OPV) was not adequately managed at primary and sub-health centres in rural areas. In India, at grass root level ANMs are the key persons, who handle the vaccine and equipment. So it was necessary to assess their knowledge and practices about management of cold chain system. Sufficient cold chain space is available at the district and block level. Some PHCs do not have electrical cold chain equipments. Although the breakdown rate is very low for existing cold chain equipments, yet cold chain management is not followed as per prescribed guidelines. Thus, necessary action can be taken for effective management of cold chain to ensure that the children get potent vaccines and are protected from the vaccine-preventable diseases. The management of cold chain system is the most important component of immunisation on which success of the programme depends.

Cold chain i.e. the system of transporting, storing and distributing vaccine in a potent state at recommended temperature till it is administered to an individual is the vital link between the child and immunity in immunisation against vaccine-preventable diseases (VPDs). Vaccination is being practiced in India since early 1900s. A formal programme under the name of EPI was launched in 1978. This gained momentum in 1985 under Universal Immunisation Programme (UIP). From April 2005, immunisation is an important component of Reproductive and Child Health (RCH) II under the National Rural Health Mission (NRHM). In the year 2008, the world is half way to the target for achieving Millennium Development Goals by 2015. One of the 8 MDGs is to reduce the child mortality rate by two-third of what it was in 1990, by 2015.

The national policy of immunisation (under UIP) of all children during the first year of life with DPT, OPV, and BCG to complete the series of primary vaccination before reaching the age of one year was launched in 1985 in a phased manner. The measles vaccine was added in 1985 and in 1990, Vit A supplementation was also added to the programme.

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Vaccines are delicate immunobiological substances and must be kept cold from the time they are manufactured to the time they are administered. In India at grass root level the ANMs are the key persons, who handle the vaccines and allied equipment. So it is necessary to assess their knowledge on practices about management of cold chain system. Hence, the investigator felt the need for the present study to seek answers to the following questions:

1. Do the ANMs have adequate knowledge about the management of the cold chain system for vaccines and practice it?
2. Do the guidelines play an important role in enhancing the knowledge and practices in the management of cold chain system for vaccines?

Objectives

The study was conducted with the following objectives:

1. To develop a planned teaching programme for ANMs on the management of cold chain system for different categories of vaccines.
2. To assess the knowledge of ANMs in management of cold chain system for different categories of vaccines.

3. To assess the practices of ANMs in management of cold chain system for different categories of vaccines.
4. To find out the correlation between knowledge and practice of ANMs in managing cold chain system.
5. To assess the effectiveness of planned teaching programme regarding management of cold chain system for different categories of vaccines.

Review of Literature

Samant Y, Lanjewar H, Parker L, Block D, Stein B, Tomar G (2007) conducted a study on relationship between vaccine vial monitors and cold chain infrastructure in a rural district of India. The potency of oral polio vaccine (OPV), a heat-labile vaccine, is preserved by the cold chain. Forty-six health centres in a rural district were included in our evaluation of the cold chain equipment and the vaccine vial monitors, among these vaccine vial monitor stage I was found at 58 percent of the health centres, 33 percent of the health centres reported stage II and 9 percent reported a stage III, indicating weaknesses in the cold chain mechanism. Cold chain for the OPV was not adequately maintained at primary and sub-centres in this district.

Arun Aggarwal & Amar Jeet Singh (1995) conducted a study on evaluation of cold chain system in rural Haryana during August - September 1992. In two districts of Haryana there were frequent breakdowns of ice-lined refrigerators during the previous year. The study revealed that defective stablisers and electricity plugs and sockets were the reason of breakdown in many cases. Seven vaccine carriers out of 25 examined had crakced wall lining. Lids of carriers were also not kept tight during vaccination sessions. Response lag of the health workers and medical officers in case of breakdowns was delayed. The study recommended one day refresher course exclusively on cold chain maintenance at community health centre level.

Jain R, Sahu AK, Tewari S, Malik N, Singh S, Khare S, Bhatia R (2003) conducted a study to analyse monitoring of the cold chain of 674 OPV field samples collected at four different levels of vaccine distribution viz., immunisation clinics, district stores, hospitals and primary health centres (PHC) from states of Uttar Pradesh, Madhya Pradesh and Delhi as per WHO protocol. Ten samples each of vaccine vial monitor (VVM) were exposed to 25°C and 37°C, and 10 samples as controls were kept at -20°C. VVMs were scored daily till they attained grade 4 and each sample was subsequently subjected to potency testing for individual polio serotypes 1, 2 and 3, and TOPV. Of the 674 samples tested it was observed that: samples from immunisation clinics and district stores had an acceptable VVM score of grade 1 and 2; however the probable risk that a sub potent vaccine could have been administered was 2.15 percent. In 2.5 percent samples received from district stores vaccine had a VVM score of grade 3 (i.e., discard point), although when tested the vaccine was found to be potent (i.e. leading to the vaccine wastage). With exposure to higher temperatures, VVM changed score to grade 2 and 3 when the vaccine was kept at 25°C / 37°C, and the titres of individual serotypes 1, 2 and 3 and TOPV were beyond acceptable limits.

Mukherjee A, Ahluwalia TP, Gaur LN, Mittal R, Kambo I, Saxena NC, Singh P (2004) in a study on vaccine wastage during a pulse polio immunisation programme in India under the Indian Council of Medical Research (ICMR) covered approximately 31,000 immunisation booths all over the country. Estimated wastage at the OPV administration point was estimated to be 14.5 percent with a wastage factor of 1.17 which is well below the assumed wastage of 33 percent and the corresponding wastage factor of 1.5 in the PPI programme. The wastage and wastage factors in our study were also less than the wastage of 25 percent and the wastage factor of 1.33 stipulated by the WHO. Minimum wastage (6.3%) was observed at Kanchipuram and maximum wastage (22.1%) at Kanpur. Further, the wastage of unopened vials and vials during use was also observed following colour changes on the VVM, indicating poor cold-chain maintenance at the immunisation site. In total, 13 booths reported wastage of nine or more unopened vials, whereas 19 booths reported wastage of nine or more vials during use because of colour changes on VVM. Other reasons for wastage of vaccine were also observed from a sample of booths. The technology of introducing VVM on OPV vials for monitoring the cold-chain was proved useful in mass vaccination programmes.

Methodology

A pre-experimental research approach with one group pre-test post-test design was used. There was no control group independent variable was planned teaching programme and dependent variable was knowledge and practice, attribute variables being age, academic qualification, working place, total professional experience, in-service training on cold chain system and posting place. Study was conducted in CHCs, PHCs and subcentres in Chhindwara (MP). Target population was 60 ANMs working in rural areas. Non-probability convenience

Table 1: Frequency and percentage distribution of pre-test knowledge of ANMs regarding management of cold chain system for different categories of vaccines (N=60)

Level of knowledge	Range of score	Frequency	Percentage
Poor	0-10	20	34
Inadequate	11-20	30	50
Adequate	21-30	10	16
Excellent	31-40	-	-
Total		60	100

Table 2: Frequency and percentage distribution of pre-test practice of ANMs regarding management of cold chain system for different categories of vaccines (N=60)

Level of practice	Range of score	Frequency	Percentage
Poor	0-10	15	24
Inadequate	11-20	25	42
Adequate	21-30	20	34
Excellent	31-40	-	-
Total		60	100

Table 3: Frequency and percentage distribution of post-test knowledge of ANMs regarding management of cold chain system for different categories of vaccines (N=60)

Level of practice	Range of score	Frequency	Percentage
Poor	0-10	-	-
Inadequate	11-20	10	17
Adequate	21-30	35	59
Excellent	31-40	15	24
Total		60	100

Table 4: Frequency and percentage distribution of pre-test practice of ANMs regarding management of cold chain system for different categories of vaccines (N=60)

Level of practice	Range of score	Frequency	Percentage
Poor	0-10	-	-
Inadequate	11-20	10	16
Adequate	21-30	30	50
Excellent	31-40	20	34
Total		60	100

Table 5: Mean and standard deviation of the pre-test knowledge and practice of ANMs (N=60)

	Mean	Standard deviation
Pre-test knowledge	13.18	5.41
Pre-test practice	17	5.92

Table 6: Mean and standard deviation of the post-test knowledge and practice of antenatal mothers (N=60)

	Mean	Standard deviation
Post-test knowledge	24.43	5.16
Post-test practice	26.1	6.22

sampling technique was chosen for the study.

Description of the tools: The tool was prepared under three sections.

Section A: This section had information about the demographic data of ANMs such as age, academic qualification, working place, total professional experience, in-service training on cold chain system, posting place.

Section B consisted of structured knowledge questionnaire on 40 items. Each item had multiple choices in nature with 4 responses in each question. There was one correct response carrying one mark and the wrong response carried zero mark. The total score was 40 for 40.

Section C had structured 3-point rating scale for practice questionnaire on 20 items; Always 2 score, Sometimes take 1 score, and Never 0 score.

Pilot Study: The pilot study was conducted from 21 - 26 February 2011 at Morar Hospital, Gwalior after a formal permission letter from the Principal, PG College of Nursing, Gwalior.

Reliability: Reliability is the degree of consistency or accuracy with which an instrument measures the attribute which is designed to measure. The "r" value calculated using the formula r1=2r/1+r was r=0.86. Thus the tool was considered reliable for the main study.

Data Collection

Pre-test questionnaire was distributed to ANMs. Data collection took around 30-35 minutes. After that planned teaching programme was explained to the ANMs. The post-test was collect after 5 days. Same questionaire was distributed to ANMs. The data collected was grouped and analysed. It gave the evidence that the tool was feasible, reliable and practicable.

Result and Discussion

Structured questionnaire and check list were used to assess the knowledge and practice regarding cold chain management with different categories of vaccines (Table 1).

It was found that 34 percent of the ANMs (n=20) had poor knowledge, majority of ANMs (n=30, 50%) had inadequate knowledge, only 10 (16%) had adequate knowledge, not a single ANM had excellent knowledge, 15 ANMs (24%) were in poor practice group, 25 ANMs (42%) in inadequate practice group, and 20 ANMs (34%) were in adequate practice group and not a single ANM had excellent practice before administration of planned teaching programme.

After administration of planned teaching programme not a single ANM had poor knowledge, only 10 ANMs (17%) had inadequate knowledge, ma-

jority of ANMs (n=35, 59%) had adequate knowledge, and 15 (24%) had excellent knowledge and not a single ANM had poor practice, only 10 ANMs (16%) had inadequate practice, majority of ANMs (n=30, 50%) had adequate practice, and 20 ANMs (34%) had excellent practice.

The mean score of post-test knowledge was found to be 13.18 with standard deviation of 5.41 and the mean score of post-test practice was found to be 17 with standard deviation of 5.92.

The mean score of post-test knowledge was found to be 24.43 with standard deviation of 5.16 and the mean score of post-test practice was found to be 26.1 with standard deviation of 6.22. The 't' test value of knowledge was 23.64 with 0.05 level of significance with tabulated t value as 2.015.

So 't' calculated > 't' tabulated means planned teaching programme is effective for increasing the knowledge. The 't' test value of practice was 24.57 with 0.05 level of significance where tabulated 't' value is 2.015. So 't' calculated > 't' tabulated means planned teaching programme is effective for increasing the practice.

Conclusion

Cold chain management for different categories of vaccines for the improvement of knowledge and practices using planned teaching programme was effective for the ANMs who are working in the CHCs, PHCs and sub-centres. It was found that the knowledge and practice improved positively beyond the significance level.

Recommendations

On the basis of the study, it is recommended that:-

- The study can be replicated with large number of sample.
- A comparative study can be done among urban and rural areas ANMs.
- Effective information, education and communication packages can be prepared to improve the knowledge and practice of ANMs.

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