

A Cross Sectional Study to Assess Knowledge of Health Care Workers Regarding Measles Vaccine and Cold Chain Management at Health Facilities in a District of Jammu and Kashmir, India

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Abstract

Background: In India, particularly in Jammu and Kashmir, maintaining the quality of vaccines has been one of the major obstacles to immunisation programmes. This might be mostly explained by health professionals' expertise in cold chain management. This study was undertaken since there hasn't been much research relating to health professionals' understanding of cold chain management in Jammu and Kashmir.

Methods: A cross-sectional study was conducted in Rajouri district in Jammu and Kashmir within one month. 95 Healthcare workers were recruited in this study, but only 92 met the inclusion criteria. A structured questionnaire was made, and the collected data were analysed by using Statistical Package for Social Sciences version 23.

Results: Females made up the majority (77.2%). The age range of 30-44 years was represented by 61.9% of participants. The majority (59.8%) had a minimum of ten years of job experience. However, just 26.1% of people had a bachelor's degree or more. The first dosage of the measles vaccine was administered at a time that almost all of the medical staff were aware of. The knowledge evaluation score was computed using a 100% scale. 20% was the average knowledge score. Most healthcare professionals are unsatisfactorily knowledgeable about cold chain management and the measles vaccination.

Conclusion: It was determined that healthcare personnel's knowledge of vaccines and cold chain management was inadequate. We advised the relevant health authorities to regularly educate staff members about the many facets of immunisation and vaccine management. To determine the cause of the lack of knowledge among healthcare professionals, further in-depth study is needed.

Keywords: Measles Vaccine, Knowledge, Cold Chain Point.

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Introduction

World Health Assembly in 2010 established three milestones to be achieved by 2015 for eradication of measles, i.e., increase routine coverage with the first dose

of measles containing vaccine by more than 90% nationally and more than 80% in every district, reduce and maintain annual measles incidence to less than 5 cases per

million, and reduce estimated measles mortality by more than 95% from the 2000 estimate. [1] In 2019, Government of India along with other countries in the World Health Organisation South East Asia region adopted the goal of measles and rubella elimination by 2023. During 2017- 2022, India adopted a national strategic plan for measles and rubella elimination, introduced rubella containing vaccine in the routine immunisation programme, launched a nationwide measles rubella supplementary immunisation activity, transitioned from outbreak-based surveillance to case based acute fever and rash surveillance, and doubled the number of laboratories in measles rubella network. [2]

Vaccination is considered as one of the most effective interventions against infectious diseases. [3] However, like many other vaccines measles vaccine is a sensitive vaccine and lose its potency when stored out of the recommended temperature range. [4] Once lost vaccine potency cannot be regained. [5] Therefore, factors like cold chain and vaccine management, knowledge and skills of cold chain handler, and proper implementation of immunisation sessions are important for success of immunisation programme. [6,7]

Health care workers are often considered as most trusted source of immunisation related knowledge. They are in best position to understand the patient needs and explain in appropriate way the benefits of vaccination. [8] Published studies have shown inadequate knowledge of healthcare workers regarding expanded programme of immunisation and cold chain management in many parts of the world. [9,10] A study conducted by Uskun *et al.*, [11] found that there is a positive relationship between knowledge of health workers and immunisation coverage.

Measles outbreak can happen in areas in which people may be unvaccinated or under vaccinated. [12] India is considered as the capital of recent outbreaks of measles in the

world. Between October 2021 and September 2022, there were an estimated 172 measles outbreaks with a total of 12589 measles cases. [13] As per the NFHS-5 (2019-2021) data, 87.9% of children aged between 12-23 months received the first measles containing vaccine, whereas only 31.9% of children aged between 24- 35 months received second dose of measles containing vaccine. [14] The major reasons of measles outbreaks are vaccine hesitancy, poor living condition, inadequate health services, poor nutrition and missed vaccine doses. [15]

Despite the considerable improvement of measles immunisation coverage in India, Measles outbreak are continued to occur in many parts of India. A recent outbreak of measles in two health blocks of Rajouri district in Jammu and Kashmir prompted us to undertake this study. The objectives of the study was to assess the knowledge of health care workers on measles vaccine and cold chain management and to assess the status of cold chain equipment at cold chain points.

Materials and Methods

This cross-sectional study was conducted in two health blocks of Rajouri district in Jammu and Kashmir. The study period was one month (Feb-March 2023). This was a health facility based study and study participants were the health workers directly involved in immunisation activity and management of cold chain. A total of 95 Health Care Workers (Multipurpose Health Workers and Pharmacists) were selected for the study using Consecutive sampling technique. All the cold chain point of the two health blocks were selected for on spot observation of cold chain equipment.

Exclusion criteria: Those who were not directly involved with the immunisation or cold chain management, refused to participate, or not present at the time of study.

Data Collection and Analysis

A structured questionnaire was developed for data collection from extensive literature search. [16,17] Participants knowledge on measles vaccine and cold chain management was assessed by a 15 items self-administered structured questionnaire in addition to the information on sociodemographic profile of the participants. A 20 items check list was prepared from the Immunisation hand book for Medical officer (Ministry of Health and Family Welfare Government of India) for on spot observation of the status of cold chain equipment at cold chain point. Data from the Health Care Workers were collected during their meeting at Block Headquarter and on spot observation of cold chain was done by individually visiting each cold chain point.

Ethical clearance was sought from Institutional Ethics Committee. Permission was also obtained from Concerned Block Medical Officers. During analysis the knowledge score was categorised as 0-69% as unsatisfactory and 70-100% as satisfactory. The collected data was analysed by using Statistical Package for Social Sciences version 23.

Results

Characteristics of Study Participants

A total of 92 Health Care Workers participated in the study. Majority were Females (77.2%). 61.9% of participants were in the age group of 30-44 years. Majority (59.8%) were having work experience of more than 10 years. But only 26.1% were having graduation and above level of education. (Table 1).

Table 1: Distribution of study participants by their demographic characteristic. (N=92)

| Characteristics | Number (%) |
|----------------------------|------------|
| Sex | |
| Male | 21(22.8) |
| Female | 71(77.2) |
| Age in Years | |
| 18-29 | 16(17.4) |
| 30-44 | 57(61.9) |
| 45-60 | 19(20.7) |
| Work Experience | |
| 0-4 years | 12(13) |
| 5-10 years | 25(27.2) |
| >10 years | 55(59.8) |
| Educational status | |
| Undergraduate | 68(73.9) |
| Graduate and above | 24(26.1) |
| Profession | |
| Multipurpose health worker | 73(79.4) |
| Pharmacists | 19(20.6) |

Knowledge of Health Care Workers on Measles vaccine and cold chain management

Nearly all the health care workers knew regarding the time of administration of first dose of measles vaccine. Only 5% were aware about the type of measles vaccine used in national immunisation schedule.

75% participants correctly mentioned the route of administration of measles vaccine. Only 17% correctly answered the question on storage site of measles vaccine. Only 8% were aware about the time and condition for defrosting of DF/ILR. (Table 2). The score of knowledge assessment was calculated out of 100%. The mean score of knowledge was 20%. Majority of health care workers

have unsatisfactory knowledge on Measles vaccine and Cold chain management.

Table 2: Healthcare workers who provided correct responses to the knowledge question on measles vaccine and cold chain management [N=92].

| Questions | Number (%) |
|---|------------|
| Measles Immunisation Day is celebrated on | 48 (52) |
| Under Universal Immunisation Programme the total doses of Measles vaccine are | 65 (92) |
| The first dose of measles vaccine is given at | 90 (97) |
| The route of administration of measles vaccine is | 69 (75) |
| Type of measles vaccine used in UIP in India is | 5 (5.4) |
| Maximum age up to which measles vaccine can be given is | 25 (27) |
| Side effects of measles vaccine are mild fever and rash | 37 (40) |
| Measles vaccine can lead to Toxic Shock Syndrome | 21 (22) |
| Open Vial policy is applicable to Measles vaccine | 53 (57) |
| Site of administration of Measles vaccine as per National Immunisation Schedule | 67 (72) |
| Storage site of measles vaccine in ILR at | 16 (17) |
| In case of power failure vaccine can be stored in | 33 (35) |
| Defrosting of ILR/DF should be done | 9 (8) |
| Temperature of ILR/DF should be monitored | 51(55) |
| Measles vaccine can be used after opening | 60 (65) |

Vaccine handling and cold chain condition at health facility

Cold Chain room at ten health facilities acting as a vaccine storage point were observed. At all the health facilities cold

chain equipment was kept away from direct sun light. At 60% of health facilities cold chain room was well ventilated. At only two health facilities lid of cold chain equipment was kept locked. (Table 3)

Table 3: Information on cold chain management at cold chain point (vaccine storage site at health facility)

| Indicator | Yes | No |
|---|----------|--------|
| The exterior of ILR/DF is clean | 8(80%) | 2(20%) |
| ILR/DF is firm on the floor | 9(90%) | 1(10%) |
| ILR/DF is properly levelled | 10(100%) | 0 |
| Its sides are a minimum of 10 cm away from any wall or object | 7(70%) | 3(30%) |
| ILR/DF is away from direct sunlight | 10(100%) | 0 |
| The cold chain room is well ventilated | 6(60%) | 4(40%) |
| Lid seals properly without gap on all sides | 10(100%) | 0 |
| There is space between rows for air circulation | 9(90%) | 1(10%) |
| Temperature indicated is within specified range | 10(100%) | 0 |
| One voltage stabilizer connected for each CCE | 10(100%) | 0 |
| Plug of voltage stabilizer fits properly and is not loose in the power socket | 8(80%) | 2(20%) |
| Temperature is recorded minimum twice a day | 10(100%) | 0 |
| Lid is kept locked | 2(20%) | 8(80%) |
| Lid seal is clean on all sides | 6(60%) | 4(40%) |
| Freeze sensitive vaccines are kept in basket and not touching any cooling surface | 10(100%) | 0 |

| | | |
|---|----------|--------|
| Connections of equipment to voltage stabilizer are proper and not loose | 10(100%) | 0 |
| Electrical connections are proper | 10(100%) | 0 |
| No abnormal sound | 9(90%) | 1(10%) |
| Separate dial/stem thermometer is kept among the vaccines | | |
| Reading of dial/stem thermometer is within desired temperature range | | |

Factors associated with knowledge on measles vaccine and cold chain management

In this study knowledge of Health care workers on measles vaccine and cold chain management was not significantly associated with any variable we studied. However Graduation and above level of qualification and greater than 10 years of work experience were observed as determinants of satisfactory knowledge as compare to participants who have less than 10 years of work experience and educational qualification was undergraduate.

Discussion

This study sheds light on the understanding of health professionals at public health institutions in Rajouri district about cold chain management and its related aspects. According to this survey, 20% of medical professionals were sufficiently knowledgeable about cold chain management. This number closely matches that of a research conducted in central Ethiopia, which found that 56% of healthcare personnel had adequate understanding of cold chain management [19].

However, it is significantly lower than a Malaysian research from 2013 that found 78.2% [20]. Given that only medical practitioners were involved in a research in Malaysia, this gap may be the result of different staff motivation levels and study participants' educational backgrounds. About 55% of the respondents to this survey were aware of the ideal temperature range for vaccine storage. This result is higher than a study conducted in Cameroon

in 2015 [21], and this discrepancy may be due to geographical and sociocultural differences in the studies. This finding is consistent with a study done in Western India in 2013 in which 80% of professionals knew the recommended range of vaccine storage [22, 23].

The medical personnel were aware of the correct measles vaccination compartment. This result is quite comparable to one from 2015 research conducted in the North-Western area of Cameroon, where 62.3% of medical professionals were able to identify the precise compartment of the measles vaccination [20]. It differs significantly from research conducted in central Ethiopia in 2012, where 71.6% of medical experts were able to identify the precise compartment of the measles vaccination [20]. The disparity might be brought on by a lack of training, a heavy workload, or personnel turnover. More than half of medical experts could name one vaccination that is particularly heat-sensitive. This number is in line with research done in the heart of Ethiopia [20], although it is substantially lower than research done in Malaysia in 2013 [7]. The knowledge of the vaccinations that are most susceptible to colds was held by one-third (33.2%) of health professionals; this conclusion is greater than that of a research conducted in central Ethiopia [20] but lower than that of a study carried out in Malaysia [7].

The majority of the refrigerator thermometer readings on the data collecting day were within the expected range of 2°C to 8°C. This result is greater than one from central Ethiopia [20], but it is consistent with research done in Saudi Arabia [21]. On

the other hand, as indicated by research in Burkina Faso [22], sometimes a little period of temperature measurements does not confirm a cold chain's soundness. According to research, health professionals who received training in cold chain management knew more than their untrained peers. The outcome is in line with Malaysian research [7]. According to research in the North-West Region of Cameroon and Malaysia [7, 14], the use of guidelines by health professionals is thought to improve cold chain management since this raises their understanding of the subject. [23]

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Limitation

The cross-sectional design of this study may make it more difficult to discern a temporal association, and its constrained scope may make it more difficult to generalise the study's findings to a larger population. But given how little is known about cold chain management in India, this discovery raises the question of why outbreaks occur in places with high vaccination rates.

Conclusion

Knowledge of Health care workers on vaccine and cold chain management was found as unsatisfactory. We recommended the concerned health authorities to sensitise the workers on periodical basis regarding various aspects of immunisation and vaccine management. More extensive research is required to find out the reason of poor knowledge among Health Care Workers.

Public Health Implication: Lack of satisfactory knowledge on measles vaccine and cold chain management may hamper the progress towards measles elimination. A robust education and continued sensitisation of ground level workers is required for achieving the time bound goal of measles elimination.

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