Supportive supervision of routine immunization in Rajnandgaon district of Chhattisgarh

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ABSTRACT

Background: Immunization coverage in Chhattisgarh has never been abysmal but the improvement is rather insignificant over the years. Some more interventions are essential to strengthen different aspects of immunization services such as micro-planning, cold-chain and logistics management, monitoring/supportive supervision, and community mobilization. The present study was considered as a part of ongoing UNICEF funded Project on Supportive Supervision of Routine Immunization in Rajnandgaon district undertaken by the Department of Community Medicine, Government Medical College, and Rajnandgaon CG with the objectives to observe key quality parameters at Ice Lined Refrigerator (ILR) points and to assess knowledge and practice of Vaccine Cold Chain Handler (VCCH). Methods: A facility-based, cross-sectional study (repeat survey) was conducted from May 2017 to June 2018 in the Rajnandgaon district of Chhattisgarh. First phase of the study was conducted from May 2017 to November 2017 and repeat survey was conducted from December 2017 to June 2018. Structured questionnaires as a part of standard tool prescribed by Government of India was used for the collection of required data. Results: The cumulative score status out of all the 50 centres in Rajnandgaon district showed improvement in 35 centres. The score of important components such as vaccine management, equipment maintenance, temperature monitoring, and monitoring and supervision information improved, but that of background information and human resource component decreased. Conclusion: Supportive supervision strategy can be more beneficial in improving the cold chain maintenance process provided that components such as logistic, infrastructure, and manpower are in place to enhance service delivery. Supportive supervision is a continuous process, so regular follow-up and monitoring visits are essential to achieve the targets.

Keywords: Cold-chain, immunization, supportive supervision, team work, two-way communication

Introduction

Among various interventions for reducing infant mortality, immunization is one of the most important and effective interventions that prevents deaths due to vaccine preventable diseases (VPD). Immunization coverage in Chhattisgarh has never been abysmal but the improvement is rather insignificant over the years. Fully immunized children (FIC) coverage rate as per NFHS-3 (2005–2006) – 48.7%, DLHS-3 (2007–2008) – 59.3% and further improved to 76.4% NFHS-4 (2015–2016). Ministry of Health and Family Welfare, Government of India, implemented “Mission Indradhanush,” which was launched in December 2014. The aims of this initiative were to vaccinate at least 90% of pregnant women against tetanus and ensure that all children are fully vaccinated against seven vaccine preventable diseases before they reach the age of 2 years. As per GOI directives, the year 2012 was declared as Year of Intensification of Routine Immunization and “Immunization Weeks” were organized in selected low coverage areas throughout the state which were continued in 2013. It has been observed that besides these measures, some more interventions are essential to strengthen different aspects of immunization services such as micro-planning, cold-chain and logistics management, monitoring/supportive supervision, and community mobilization.

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Supportive supervision (SS) is defined as a process that promotes quality at all levels of the health system by strengthening relationships within the system, focusing on the identification and resolution of problems and helping to optimize the allocation of resources promoting high standards, team work, and better two-way communication. The Ministry of Health and family Welfare (Mo&FW) guidelines 2005 describes supportive supervision as a process which promotes quality outcomes by strengthening communication, identifying and solving problem, facilitating team work, and providing leadership and support to empower health providers to monitor and improve their own performance (GOI). It is carried out in a respectful and nonauthoritarian way with a focus on using supervisory visits as an opportunity to improve knowledge and skills of health staff [Table 1].

Supportive supervision as a strategy in the delivery of public health services promotes quality at all levels of the health system through development of professional competence among the health workforce. Emerging evidences in Indian context infer that supportive supervision improves immunization coverage and also serves as an efficient tool to strengthen local health system. Another review reported that Community Health Workers (CHW) make diverse contributions towards strengthening immunization program implementation by incorporating evidence-based strategies. Supportive approach, where supervisors and health workers work together to solve problems and improve performance, delivers improved results for the immunization programme. The authors concluded that systematic supervision using clearly defined and quantifiable indicators can improve service delivery considerably at a modest cost.

Authors observed a significant improvement in vaccine management and infrastructure handling at CCPs from initial to the second visit. Knowledge and skills of cold chain handlers regarding cold chain management at session site were improved adequately. Based on results from the individual studies reviewed, supervision is likely to be a beneficial intervention for health care worker’s performance and quality improvement in primary care settings in low and middle-income countries. What remains unclear, however, is what type(s) of supervision are optimal for performance improvement (e.g., clinical, managerial, etc.) and what is the optimal “dose” and frequency of supervision to achieve and to sustain durable gains in quality and health care worker’s performance. A study done by Mallik et al. at cold chain points of Kolkata city using intervention such as reorganization of cold chain point and training found substantial improvement in the status of CCP that include significant improvement of interior condition of cold chain equipment, placement of vaccine, and temperature maintenance. Persistent gap was also found that included nonavailability of cold chain equipment such as voltage stabilizers, back-up generator services, and separate cold chain room. Preventive maintenance and monitoring and supervision by Medical Officer were also lacking. This intervention did not give stress on feedback, mentorship, and breaking communication barriers at different levels of hierarchies. The present study focussed on supportive supervision strategy to fill these gaps.

The overall aim of the study was to assess the effect of a “supportive supervision” strategy on the quality of immunization services. The specific objectives were (1) to observe key quality parameters at ILR points; (2) to assess knowledge and practice of VCCH; and (3) to recommend to the state government and to UNICEF about the usefulness of the supportive supervision strategy.

### Methods

A facility-based, cross-sectional study (repeat survey) was conducted from May 2017 to June 2018 in the Rajnandgaon district of Chhattisgarh. The State Vaccine Store located at Raipur caters to the entire Chhattisgarh State through Regional and District Vaccine Stores (DVS). These DVSs supply vaccines to the cold chain points located at CHCs and PHCs. The CCPs further cater to the session sites in respective Subcentre and Anganwadi center, etc. The state has one State Vaccine Store, three Regional Vaccine Stores, 27 District Vaccine Stores, 523 Cold Chain Points, and 14,400 session sites. The cold chain system in Chhattisgarh consists of 1,391 working Cold Chain Equipments which includes 1 Walk in Freezer, 4 Walk in Coolers, 678 Ice Lined Refrigerators (ILRs), 698 Deep Freezers (DF), and 10 solar equipments.

This study was a part of the project of strengthening routine immunization program through the Supportive Supervision Strategy, done by the department of Community Medicine, Government Medical College, Rajnandgaon. In Rajnandgaon district, total 50 CCPs are working including one DVS. All CCPs were included in this study. Faculty from Medical College and External Monitor were involved in data collection as team members. Medical college team includes two faculty of the rank of Assistant Professor. First phase of the study was conducted from May 2017 to November 2017 and repeat survey was conducted from December 2017 to June 2018. All the supervisors, team leader, and project coordinator had undergone training at Raipur headquarter by UNICEF experts to assess cold chain equipment status, practices of cold chain handlers to maintain uniformity of data and to avoid bias. The permission from CMHO, Rajnandgaon was sought out before the start of the project. Visits to the CCPs were scheduled on the day of

| Table 1: Comparison between supervision approaches |
|--------------------------------------------------|
| **Control approach**                             |
| Focus on finding faults                          |
| within individuals                               |
| Policeman                                         |
| Episodic problem-solving                         |
| Little or no follow-up                           |
| Punitive actions intended                        |
| **Supporting approach**                          |
| Focus on improving performance and               |
| building relationships                           |
| More like teacher, coach, mentor                 |
| Use local data to monitor performance and        |
| and solve problems                               |
| Follow-up regularly                              |
| Only support provided                            |


immunization session. Structured questionnaires as a part of standard tool prescribed by Govt. of India was used to collect required relevant data. Supervisors collected information by observing health-facility environment, listening to VCCH, reviewing the records using a checklist.

**Role and responsibilities of the supervisors**

1. Collecting information regarding background information of the Cold Chain Point, Cold Chain Equipment status, Vaccine storage and handling practices, knowledge and practices of the VCCH
2. Problem-solving and feedback
3. On job training
4. Recording the results of the supervision
5. Reviewing recommendations from the past visits.

Total six components were assessed during supervision which include (the maximum score for each component is given in the bracket)

1. Background information of the Cold Chain Point (20)
2. Information on human resource (15)
3. Equipment maintenance (50)
4. Temperature monitoring (25)
5. Vaccine management (200)
6. Monitoring and supervision information. (15).

Each Cold Chain Point was assessed with overall score of 325. Background information of Cold Chain Point includes availability of updated micro-plan for current financial year with complete vaccine, logisitic estimate, and availability of adequate space for dry storage. Information on human resources includes availability of Medical Officer and VCCH and their training on latest VCCH and routine immunization module. Equipment maintenance include reporting of breakdown of CCE, availability of AMC/CMC for repair and maintenance, their service provided, VCCH daily duty of carrying out Planned Preventive Maintenance as per checklist, frost accumulation in the walls of ILR and DF, placing of ILR and DF as per specified guideline, correct storage of cold boxes and vaccine carrier, correct storage of icepacks in DF, and displaying contingency plan and latest standard job aids. Temperature monitoring include availability of dedicated thermometer with temperature log book for each functional CCE, twice daily recording of temperature, record of Planned Preventive Maintenance, defrosting and power-cut, and VCCH skill of demonstration of temperature reading from the thermometer.

Monitoring and supervision information include monitoring visits by district-level authority in last 3 months with record, attendance of MO I/C at district for review meeting, and cleanliness of vaccine store and its premises with grading. Vaccine management include availability of standard vaccine and logistic stock/issue registers and their updating, records of damaged vaccine, and diluents in stock register in last 3 months, documentation of physical stock verification in last three months, calculation of physical stock and stock register doses differences of measles vaccine, measles vaccine diluent and pentavalent vaccine, documentation of minimum and maximum stock level for all antigen, correct storage of vaccine in ILR, preparation of diluents 24 h before, inclusion of items other than vaccine in CCE, presence of vaccine vial beyond usable VVM in ILR, presence of frozen vaccine, presence of vaccine vial beyond expiry date, presence of vaccine vial with unreadable label, presence of open vial with or without date and time mentioned on it, presence of opened vaccine vial of last session kept as per guidelines, skill of VCCH to show icepack conditioning, availability of adequate space for icepack conditioning, presence of vaccine in deep freezer, calculation of vaccine wastage rate for penta-valent vaccine for last month, reporting of open vials returned on same day of vaccination, documentation of AVD plan for all session sites, and disposal of immunization waste.

Supportive supervision in the present study comprised any support provided by the internal supervisors which include Medical College team and External Monitors toward improvement of service delivery and effective implementation of immunization program.

**Statistical analysis**

The data was collected, checked for completeness and correctness, compiled using MS Excel, and analyzed using IBM SPSS B Statistics software for Windows, version 22.0. Statistical tools applied were mean, standard deviation, and paired t-test and Chi-square test as test of significance. While analyzing data, P value of less than 0.05 was considered statistically significant.

**Results**

While assessing the CCP at different levels, after giving the supportive supervision support, the cumulative score improved at 26 CCPs out of 39 CCP at PHC level, 7 CCPs showed improvement out of 9 CCP of CHC level, and CCP located at District Hospital and District Vaccine Store also showed improvement [Table 2]. The cumulative score of CCP improved equally even if the duration between two visits was more or less than 4 months. The relation was statistically not significant [Table 3].

The final cumulative score of CCP increased after supportive supervision and was found to be statistically significant. The important component such as “Vaccine Management” and “Equipment Maintenance” score improved and found to be statistically significant. The final score of “Temperature Monitoring” and “Monitoring and Supervision Information” also improved. But the score of “Background Information” and “Human Resource” component decreased [Table 4].

**Discussion**

Som et al. conducted study in the four districts of Odisha State by observing ILR points to validate changes that have taken place in the last 2 years in the practice of supervisors with respect to basic management functions after the intervention.
of supportive supervision at the ILR point level. A statistically significant difference in the performance of the intervention districts before and after the intervention was found in all the broad thematic areas, especially with regards to two subcomponents, i.e., “Reporting and documentation” and “Cold chain and Logistics.” The ILR points of intervention districts had significant improvements in reporting and maintenance of logistics after the intervention.

Djibuti et al. stated that supportive supervision intervention independently contributed to relative improvements in district-level service delivery outcomes such as vaccine wastage factors and DPT-3 immunization coverage rate. In the present study also, after the supportive supervision, CCP located at District Hospital and District Vaccine Store showed improvement. Vaccine management component also included vaccine wastage rate which showed improvement.

In a study conducted by Panda et al. with focus to compare the opinion and practices of frontline health workers and their supervisors in four interventional districts (ID) and two control districts (CD) of Odisha found that the mean knowledge score of supervisors in CDs was significantly higher than in interventional groups. The control group performed better in solving certain hypothetically asked problems, whereas the intervention group scored better in others. Health workers in IDs gave a lower rating to their

Table 2: Cumulative score status at different levels of cold chain centre

| Cold Chain Point Center                  | Number | Score Improved | Score not Improved | Chi-square test Value, df, P value |
|-----------------------------------------|--------|----------------|--------------------|-----------------------------------|
| Primary Health Centre                   | 39     | 26             | 13                 | 1.323, 2                          |
| Community Health Centre                 | 9      | 7              | 2                  | 0.516                             |
| District Hospital and District Vaccine Store | 2      | 2              | 0                  | Yates Chi-square test value 0.123 |
| Total                                   | 50     | 35             | 15                 | Yates P Value 0.940                |

Table 3: Relation between cumulative score status and duration between two visit at CCP

| Duration between 2 visits | Cold Chain Point | Score Improved | Score not Improved | Chi-square test Value, df, P value |
|---------------------------|------------------|----------------|--------------------|-----------------------------------|
| <4 Month                  | 4                | 3              | 1                  | 0.355, 2                          |
| 4-6 Month                 | 17               | 11             | 6                  | 0.837                             |
| >6 Month                  | 29               | 21             | 8                  | Yates Chi-square test Value 0.159 |
| Total                     | 50               | 35             | 15                 | Yates P Value 0.923                |

Table 4: Final cumulative score of all components after completion of supportive supervision

| Component                              | Before/After | Mean | Standard Deviation | t-test value | P      |
|----------------------------------------|--------------|------|--------------------|--------------|--------|
| Cumulative Score                       | Before       | 65.94| 10.45              | −3.421       | 0.001  |
|                                       | After        | 71.98| 9.35               |              |        |
| Background Information                 | Before       | 83.50| 25.06              | 0.997        | 0.324  |
|                                       | After        | 78.60| 24.59              |              |        |
| Human Resource                         | Before       | 87.38| 20.05              | 2.410        | 0.020  |
|                                       | After        | 78.20| 22.03              |              |        |
| Equipment Maintenance                  | Before       | 63.46| 20.09              | −3.843       | 0.000  |
|                                       | After        | 79.80| 21.52              |              |        |
| Temperature Monitoring                 | Before       | 89.44| 19.59              | −1.885       | 0.065  |
|                                       | After        | 95.04| 10.65              |              |        |
| Vaccine Management                     | Before       | 62.40| 15.87              | −2.145       | 0.037  |
|                                       | After        | 68.08| 13.16              |              |        |
| Monitoring and Supervision Information | Before       | 43.36| 36.95              | −1.117       | 0.269  |
|                                       | After        | 51.12| 38.43              |              |        |
respective supervisors’ knowledge, skill, and frequency of supervision. Logistic and vaccine availability were better in CD. The same study also concluded that supportive supervision may not have independent effects on improving the quality of immunization services but addressing systemic issues, such as the availability of essential logistics, supply chain management, timely indenting, and financial resources could complement the supportive supervision strategy in improving immunization service delivery. In the present study also, the score of “Background Information” and “Human Resource” component was decreased but the final cumulative score of CCP was increased after giving the supportive supervision support.

Limitation of the study: Only one follow-up visit at the CCPs was taken into account and comparison with the baseline/first visit data was done. As the project is going on continuously further improvement in results can be expected.

Conclusion
Supportive supervision strategy can be more beneficial in improving the cold chain maintenance process provided that components such as logistic, infrastructure, and manpower are in place to enhance service delivery. Good administrative support from the government is the key driver in the process. Merely giving health education and training may not be sufficient in improving cold chain maintenance but good communication between different levels of hierarchy, regular monitoring, and supervision, strictly following SOP are also essential components. Supportive supervision is a continuous process, so regular follow-up and monitory visits are essential to achieve the targets. Supportive supervision strategy helps in improvement of performance and communication skill development of the health care providers at the primary level which indeed improves facility-based service delivery like IMNCI, malaria service, and medicine management. General Physicians can utilize competencies of supportive supervision at their clinic to enhance service delivery.

Recommendation
The health care workers in CCP have to handle various other activities beside the immunization services; this may be the reason for low performance in some of the components. The issue can be resolved at the State Government level.

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Conflicts of interest
There are no conflicts of interest.

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