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POLIO TEAMS PERFORMANCES FOR VACCINATION OF CHILDREN IN POLIO ERADICATION PROGRAMME "A CASE STUDY OF MULTAN DISTRICT"

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Abstract:
Poliomyelitis is a contagious viral disease that can lead to partial or full paralysis. It can be prevented by just getting the vaccine. Oral polio vaccine is the safe vaccine to curtail poliovirus circulation. Multan is known as the city of Saints. Multan is Pakistan`s seventh most populous city, having a population of 4.8 million. Multan has been infected with wild poliovirus from time to time in past years because of high population movement on shrines, trade markets, and specialized health care hospitals. Qualitative and qualitative data were collected. Teams were selected randomly. The sample size was 150 teams from different geographical areas. Teams' performances were measured keeping in view of NEAP guidelines.

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INTRODUCTION:

A descriptive case study was carried out which was analyzed through qualitative and quantitative methods. Adjusted Wald technique was used to find out the confidence interval. Twenty-eight variables were studied; twelve variable scores were below benchmark. Major grey areas were poor cold chain management in field, suboptimal areas orientation prior to the campaign and poor campaign preparation in G3 areas. Recommended temperature is to store vaccine +2 to +8 C. Only 33% teams maintained cold chain as per standard guidelines. 75% teams did not get area orientation prior to the campaign. Teams did not vaccinate miss children in G3 areas as per NEAP guidelines due to suboptimal target planning. This situation can make possible wild poliovirus re-entry in Multan any time due to suboptimal population immunity in G3 areas.

METHODS AND MATERIALS:

Hypothesis

To identify whether polio team's performance is adequate to sustain Multan Polio-free status?

The statement of problems

- The high proportion of leftover still missed children is the main concern.
- Suboptimal worksheets utilization and record keeping are identified.
- Poor knowledge and skill of volunteers are observed.
- Without using a thermometer, cold chain of the vaccine is considered to be maintained during fieldwork.
- A sense of insecurity is felt among teams during fieldwork

Objectives of Study

- To measure polio team's performances for vaccination of target children
- To assess maintenance of cold chain in the field for high-quality vaccine potency
- To identify barriers related to suboptimal missed children coverage.
- To validate polio teams tally sheets data whether it meets national guidelines

RESEARCH METHODOLOGY:

Descriptive case study research design was used. The qualitative and quantitative approaches were adapted to collect data. The quantitative data was collected by interviewing teams. The qualitative data was collected by observations methods and documents review. Data was compiled at union council level and union council's data is compiled at District level.

There is 131 union council in Multan regarding administrative control and management. First of all, union councils selected randomly, four union councils from each tehsil of Multan as there are four tehsils. Ten teams selected from each union council from union council. As there are three types of areas regarding working modality ie G1 soft area, G2 hard area, and G3 very hard area. Fifty teams were selected from each type of areas to assess team's performance.

One hundred and fifty teams are selected from union councils through random sampling. Random sampling is done in computer software. Cumulative frequency of union council population is calculated. Sample interval was formulated. First union council will be selected randomly through computer software, and then sample interval will be added to choose subsequently required union councils. One hundred and fifty teams are selected from selected UCs. Independent and dependent variables are studied. Teams were interviewed in the field, checked their working modality, observed their interaction with families, monitored their cold chain and asked them pre-designed questions. Independent variables are studied like knowledge and skills of teams, team's composition, and area types. Its impact is observed. Dependent variables like vaccine management, HRMP management, total coverage against the target, missed children recording and coverage.

Data was collected indirectly, as collected their work/tally sheets from selected union councils Excel sheets and word document was used to analyze data on work/tally sheets. SPSS software was used to make frequencies and statistical measurements. Tables, Pie charts, and graph developed to reflect data and performances of polio teams. Data was converted in printed form. The conclusion was drawn from data findings and figures. Results were matched with postulated hypothesis related to research question or topics.

Data Analysis

Adjusted Wald technique was used to find out confidence interval More than 95% variables show high-quality teams performances. Less than 90% variables show suboptimal performances of the teams Confidence Interval. It provides faith in sample estimates. It gives a range for the unknown population. It enhances confidence in researcher and manager. Rating scales, task-time, revenue, weight, height or temperature is continuous data. Pass/fail, yes/no, agree/disagree is discrete data and is coded with a 1 or 0 score.

Discrete data

Adjusted Wald technique was used to find out the confidence interval Example IPC skill. Add all the 1s to make average and then divided by the denominator. Total yes respondents are 117 117/150 =0.78. Adjust proportion to make it more accurate by adding 2 in the numerator. Adjust sample size by adding 4 in the denominator 117+2=119, 150+4=154, 119/154= 0.77. Then multiply adjusted proportion by

1- 0.77* (1-.77) = 0.17. Divide result by sample size 0.17/154 = .001. Take square root of .001 = .031. Calculate margin of error by multiply with the standard of error .031*2 = .062

Calculate confidence interval by adding a margin of error with sample proportion and subtract margin of error from sample proportion .78+.06 = .84, .78-.06 = .72. So, the confidence interval is between .72 and .84, 72% to 84% teams have good IPC skills.

RESULTS:

The confidence interval is calculated for those indicators which are < 90%

Teams Behavioral Performances

Table 1: Teams Performances Qualitative and Quantitative Indicators

The confidence interval is between .19 to .31. About 19% to 31% teams had areas orientation prior to the campaign. The confidence interval is between .72 to .84 regarding IPC skill. About 72% to 84% teams had good IPC skill.

Results	N	Minimum	Maximum	Mean	% age	Std. Deviation
Teams members have good IPC Skill	150	1.00	2.00	1.2800	78%	.45050
Teams visited target areas before campaign	150	1.00	2.00	1.4600	25%	.50007
Valid N (list wise)	150					

Table 2: Percentage of teams maintained a standard temperature in rotary vaccine carriers between +2 to +8C on May NIDs, 2017

Results	N	Temperature Range (Centigrade)	Valid N	% age
Vaccine storage under use of polio teams	150	+2 to +8 C	49	33%
Vaccine storage under use of polio teams	150	+9 to +12 C	87	58%
Vaccine storage under use of polio teams	150	> +12 C	14	9%
Valid N	150		150	100

Recommended temperature for the vaccine storage is +2 to +8 C. The thermometer is used to record temperature. The confidence interval is between .25 to .39. About 25% to 39% teams are showing positive compliance to maintain a requisite temperature of the vaccine in field.

Table 03: Percentage of teams vaccinated missed children according to the NEAP standard during campaign days

Number of teams covered missed children according to NEAP	Number of teams checked	Valid N	% age
Number of teams covered missed children according to NEAP in G3 areas	50	27	54%
Number of teams covered missed children according to NEAP in G2 areas	50	36	72%
Number of teams covered missed children according to NEAP in G1 areas	50	31	62%

Table 04: Percentage of teams' targets met NEAP requirement in G3, G2 and G1 areas

Teams Targets as per policy	Number of teams checked	Target matched	% age
Teams target matched in G3 areas according to NEAP	50	24	48%
Teams target matched in G2 areas according to NEAP	50	37	74%
Teams target matched in G1 areas according to NEAP	50	20	40%

NEAP: National Emergency Action Plan which is developed government health department and allied partners (WHO, UNICEF, ROTARY, BILL AND MELINDA GATE, CDC and JAPAN International) every year to identify current problems and develop indicators to be achieved.

Table 05: Percentage of teams acquired police support in G3, G2, and G1 areas during the campaign days

Security Support	Number of teams checked	Security Provided	% age
Security provided to a number of teams in G3 areas	50	7	14%
Security provided to a number of teams in G2 areas	50	11	22%
Security provided to a number of teams in G1 areas	50	20	40%

Due to target killing of teams in Karachi, KPK, Quetta, and FATA. According to NEAP, provision of security is mandatory for all teams who will work in the campaign

SUMMARY:

Poliomyelitis history revealed that first case occurred about 6000 years ago in the time of ancient Egyptian. The disease was found in Egyptian mummies and carved pictures with withered and deformed limbs. Poliomyelitis, often called it polio or infantile paralysis, is an infectious communicable disease. It was caused by three serotypes of polioviruses that are serotype 1, (P1) serotype 2 (P2) and serotype 3(P3). Majority of polio cases were caused by serotype 1 poliovirus. The last case was come to the surface with serotype 2 in 1999 and with serotype 3 in November 2012. Poliovirus causes paralysis in 0.5% of cases, about 99.5% usually remained nonparalytic.

The poliovirus spread from person to person through the fecal-oral route. It invades anterior horn cell of motor neurons in the spinal cord and brain stem. Poliovirus causes partial or complete paralysis resulting in permanent disability. Paralysis can be occurred due to bulbar, spinal or bulbospinal involvement. The paralysis cannot be cured, once occurred; the only prevention is to take polio drops more than seven times. The first polio vaccine was developed by Jonas Salk that was inactivated polio vaccine (IPV) and commercially used in 1955. The oral polio vaccine (OPV) was developed by Albert Sabin and commercially used in 1961. World Health Assembly passed a resolution in 1988 to eradicate polio in the world. The task was taken up by World Health Organization, UNICEF, Rotary, and UN Center of Disease Control. The only three countries are left where poliovirus is still present that is Pakistan, Nigeria, and Afghanistan. Endgame Strategic Plan was formulated in 2013 to completely root off poliovirus from the world (2013-2018).

Multan is often called the capital of South Punjab. It is high-risk District due to its geographical location because of frequent movement of high-risk population. Multan has peculiar factors like many saint's shrines, big markets, international airport and teaching & specialized health care hospitals are attracting population from Province Sindh, Balochistan, KPK, and FATA areas. The high-risk population is usually under immune population that can allow poliovirus to circulate. High-risk populations are usually refusal community to polio vaccine, Inaccessible population to polio vaccination activities and frequently moving population, usually miss for vaccination opportunities. High-risk population movement sometimes is the nodal cause of poliovirus re-circulation in Multan. Poliovirus is erupted in Multan from time to time. Although no human polio case reported from Multan since September 2009, poliovirus has come to surface in environment samples every year. Overall polio teams' performances remained up to mark but small performance gaps can cause poliovirus eruption in environmental samples in Multan.

As the Multan is continuously exposing to the risk multiple factors, High-quality team's performances can make Multan polio-free status. All the teams do not have a high commitment because of their poor educational status and lack of quality training. There are certain variables which are below 90% regarding teams' performances which are poor cold chain management, meager IPC skill, inadequate areas orientation, improper tally sheets filling and deployment of untrained teams in the campaign.

Current performance of Multan can be sustained by focusing on main gaps in team's performances especially in G3 areas.

Table 1 showed that 98% teams followed their tour programs. 99% of teams' members were trained. 78% teams had good IPC skill. 25% teams had good area orientation before the start of the campaign. Table 2 revealed that 33% teams had maintained cold chain between +2 to +8 C of temperature. As the matter of the fact, 67% teams were not maintaining vaccine temperature in the field. Table 28 showed that about 50% teams were vaccinated missed children on the same day during the campaign according to NEAP guidelines that > 40% of total recorded miss children. Table 29 revealed that teams' vaccination targets were not met with NEAP guidelines in G1, G2, and. G3 areas. There were certain variables which showed that some teams were not performing well. Vaccine potency is doubtful because most of the teams were not maintained vaccine temperature between 2-8 C in rotary vaccine coolers. Daily missed children coverage is suboptimal. Some micro plans were not well prepared because team's targets were not well set according to NEAP guidelines as it should be 100 children per day in G3 areas, 150 children per day in G2 areas and 200 children per day in G1 areas. Some teams were inducted on campaign day, so they were not well trained for polio vaccination. Some teams could not achieve their targets more than 98% at the end of the campaign. Poliovirus can be re-established in Multan if training, supervision and data validation would not be improved because there is continuously high population movement from reservoir areas in Multan

CONCLUSION:
Data analysis revealed that 33% teams had maintained cold chain temperature between +2 to +8 C. As the matter of YAH fact, 67% teams were not maintaining vaccine temperature in the field. Although, OPV is a stable vaccine but prolongs exposure to high temperature can mitigate vaccine potency and efficacy. 100% potent vaccines can boost up the immunity of population in an effective manner and help to get high immunity profile in a specific population. Data showed that 75% of teams had not done areas orientation prior to each campaign. The areas between the teams are so packed and overlapped, sometimes teams confused to understand their assigned areas. Then, they would hardly achieve requisite coverage. Therefore, the adjoining areas between two teams' boundaries, two union council's boundaries, two tehsil boundaries and two District boundaries are more likely missed for vaccination of children. The program goal is to cover

100% geographical areas for polio vaccination of target children under 5 years of age.

The polio vaccination is a household campaign, teams have to move from house to house for the vaccination of target children that is, all the children having age less than 5 years. So, teams must have good quality interpersonal communication skill to motivate communities for vaccination and enhance the awareness of communities. There is need to polish team's behavior and skill in this regard. As data indicated that 22% teams had not good interpersonal communication skill which is mandatory means to get high-quality vaccination coverage and to enhance awareness of communities in an area. Good IPC skill, not only decreases refusal concepts among communities but also to endow with a good opportunity to record miss children who would be followed later on. Teams, micro-planning is also played pivot role for high- quality vaccination campaigns as data reveals that 52% teams targets in G1 areas, 26% teams targets in G2 areas and 60% teams targets in G3 are not laid down according to NEAP guidelines. Hard to reach areas (G3) are neglected in micro-planning which can trail to poliovirus importation in the District.

Poor micro planning and weak supervision of G3 areas can lead to poor vaccination coverage in these areas that leads to suboptimal miss children coverage on the same day of the campaign, during catch up days and after the campaign. G3 areas need to be focused more in term of micro planning, supportive supervision, training and tally sheets validation. Even these areas are not picked in LQAS due to deprived data management with monitoring and evaluation team. LQAS is usually conducted in well-developed areas which sometimes, illustrate tip of the iceberg regarding campaign deficiencies.

Some teams have high targets in hard to reach areas, hence, most of the teams cannot achieve daily miss children targets in G3 areas, it shows suboptimal union councils base micro planning. Untrained teams are deployed for polio vaccination campaign due to the insufficient planning of teams prior to the campaign. Some teams' commitment is dubious in order to achieve allocated targets according to NEAP protocols.

Poor documentations abolish data accuracy and transparency. Vaccine storage in a recommended temperature is obligatory to maintain high-quality vaccine potency. If storage condition is not met with recommended guidelines, the quantitative coverage cannot increase the immunity of target population; there would be an open window for re-establishment of virus circulation in the District. Keeping in view of above facts, high-quality micro planning, supportive supervision, and effective training sessions can print good impact on polio team's performances. So, polio teams need continuous support to achieve high-quality vaccination coverage. It would lend a hand to sustain Multan existing polio-free status.

Recommendations:
- The cold chain must be maintained between +2 - +8 C to keep vaccine safety and potency and thermometer may be used in vaccine carrier to record temperature when teams are working in the field.
- Teams should be guided and facilitated to get area orientations before the start of each campaign.
- IPC skill must be focused in teams training.
- The good training session should be planned to improve teams training skill and commitment.
- Teams' targets must be set according to areas types.
- Missed children must be vaccinated more than 40% on daily basis by all the teams.
- Teams should not be left missed children more than 2% after completion of the campaign as mention in   National Emergency Action Plan guidelines
- There should not be any change in teams' formation on the day of campaign commencement.
- Teams should complete record of all work/tally sheets accurately and transparently.
- Supportive supervision must be carried out, so good quality training of supervisors is required.

REFERENCES:

1. Ashutosh Shrivastava, Neeraj Gupta, Pramod Upadhyay,* and Jacob Puliyel St Stephens Hospital, (2012) Title: refrigeration, Vaccination, and Poliomyelitis, Published in Indian Journal of Medical Research in Delhi, Publisher: National Institute of Dehli India. Vol: 135, issue 4, Page 520-522.
2. Branson (1998) Title: "Respiratory Care". Location: California, USA. Publisher: Tribute to John H Emerson Journal. Volume-43 Pages. 567–71.
3. Chumakov K, Ehrenfeld E, Wimmer E, Agol (2007 Dec) Title- vaccination against polio should not be stopped. USA. Publisher: Nat Rev Microbiol US Food and Drug Administration; 5(12):952-958.
4. Leboeuf C (1992) Title - The late effects of Polio. Australia. Publisher-Commonwealth

Department of Community Services and Health Pages: 1-3 http://www.health.qld.gov.au/polio/ |ISBN=1-875412-05-0 }.

5. van den Ent, M. M., Mallya, A., Sandhu, H., Anya, B. P., Yusuf, N., Ntakibirora, M., ... & Sumaili, K. (2017). Experiences and Lessons From Polio Eradication Applied to Immunization in 10 Focus Countries of the Polio Endgame Strategic Plan. The Journal of infectious diseases, 216(suppl_1), S250-S259.

6. Michael, C. A., Waziri, N., Gunnala, R., Biya, O., Kretsinger, K., Wiesen, E., ... & Nguku, P. (2017). Polio legacy in action: using the polio eradication infrastructure for measles elimination in Nigeria—the national stop transmission of polio program. The Journal of Infectious Diseases, 216(suppl_1), S373-S379.

7. Poy, A., van den Ent, M. M., Sosler, S., Hinman, A. R., Brown, S., Sodha, S., ... & Mihigo, R. (2017). Monitoring results in routine immunization: Development of routine immunization dashboard in selected African countries in the context of the Polio Eradication Endgame Strategic Plan. The Journal of infectious diseases, 216(suppl_1), S226-S236.

8. Boyle, S. B. (2015). Analysis of Independent Monitoring Data from Polio National Immunization Day Campaigns in Kinshasa Province, Democratic Republic of Congo: Proportions of Missed Children from 2010-2013 (Doctoral dissertation).

9. Okeibunor, J. C., Ota, M. C., Akanmori, B. D., Gumede, N., Shaba, K., Kouadio, K. I., ... & Moeti, M. R. (2017). Polio eradication in the African Region on course despite public health emergencies. Vaccine, 35(9), 1202-1206.

10. Premji, A., Sholar, P., Wanda, L., Potnis, K., Edwards, J., Chadwick, L., & Boyd, D. L. (2018). The Quest to Eradicate Polio: Lessons Learned from Nigeria's Challenges and Successes. Center for Global Development Policy Papers. Online 11/2016. Center for Global Development.

11. Chandir, S., Dharma, V. K., Siddiqi, D. A., & Khan, A. J. (2017). Feasibility of using global system for mobile communication (GSM)-based tracking for vaccinators to improve oral poliomyelitis vaccine campaign coverage in rural Pakistan. Vaccine, 35(37), 5037-5042.

12. Ongwae, K. M., Bawa, S. B., Shuaib, F., Braka, F., Corkum, M., & Isa, H. K. (2017). Use of dedicated mobile teams and polio volunteer community mobilizers to increase access to zero-dose oral poliovirus vaccine and routine childhood immunizations in settlements at high risk for polio transmission in northern Nigeria. The Journal of infectious diseases, 216(suppl_1), S267-S272.

13. Cochi, S. L., Freeman, A., Guirguis, S., Jafari, H., & Aylward, B. (2014). Global polio eradication initiative: lessons learned and legacy. The Journal of infectious diseases, 210(suppl_1), S540-S546.

14. Touray, K., Mkanda, P., Tegegn, S. G., Nsubuga, P., Erbeto, T. B., Banda, R., ... & Vaz, R. G. (2016). Tracking vaccination teams during polio campaigns in Northern Nigeria by use of geographic information system technology: 2013–2015. The Journal of infectious diseases, 213(suppl_3), S67-S72.

15. Rutter, P. D., Hinman, A. R., Hegg, L., King, D., Sosler, S., Swezy, V., ... & Cochi, S. L. (2017). Transition planning for after polio eradication. The Journal of infectious diseases, 216(suppl_1), S287-S292.

16. Kazi, A. M., & Jafri, L. A. (2016). The use of mobile phones in polio eradication. Bulletin of the World Health Organization, 94(2), 153.

17. Hagan, J. E., Wassilak, S. G., Craig, A. S., Tangermann, R. H., Diop, O. M., Burns, C. C., & Quddus, A. (2015). Progress toward polio eradication—worldwide, 2014–2015. MMWR. Morbidity and mortality weekly report, 64(19), 527.

18. Hagan, J. E., Wassilak, S. G., Craig, A. S., Tangermann, R. H., Diop, O. M., Burns, C. C., & Quddus, A. (2015). Progress toward polio eradication—worldwide, 2014–2015. MMWR. Morbidity and mortality weekly report, 64(19), 527.

19. Mbaeyi, C., Kamawal, N. S., Porter, K. A., Azizi, A. K., Sadaat, I., Hadler, S., & Ehrhardt, D. (2017). Routine Immunization Service Delivery Through the Basic Package of Health Services Program in Afghanistan: Gaps, Challenges, and Opportunities. The Journal of infectious diseases, 216(suppl_1), S273-S279.

20. Morales, M. (2016). Progress toward polio eradication—worldwide, 2015–2016. MMWR. Morbidity and mortality weekly report, 65.

21. Russo, G., Miglietta, A., Pezzotti, P., Biguioh, R. M., Mayaka, G. B., Sobze, M. S., ... & Rezza, G. (2015). Vaccine coverage and determinants of incomplete vaccination in children aged 12–23 months in Dschang, West Region, Cameroon: a cross-sectional survey during a polio outbreak. BMC Public Health, 15(1), 630.