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Assessment of Knowledge and Practice Regarding Vaccine Storage among Nurses in Primary Health Care Centers in Althawra rejoin (Sudan) 2022 - 2023

Dr. Iqbal Abdelrahman Ibrahim Dawi,
Assistant professor of community health Nursing-Alkhawarizmi College,
Corresponding author, Email: igbaldawi@yahoo.com

Dr Mohammad Saleh Ahmed Abdallah,
Assistant professor of community health Nursing-College for Applied Medical Sciences Shaqra University-KSA

Dr. Sara Ahmed Adam Musa,
Assistant professor of community health Nursing - faculty of Nursing Sciences,
Department of Community health nursing- Khartoum University.

Dr.Mohammead Osman Yahya Mohamead,
Assistant professor of community health Nursing, department of Nursing sciences,
College of applied medical Scienses,- Burycah Colleges,KSA

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Abstract

Background: Vaccine refrigerator the last point the vaccines reach, proper vaccine storage is essential for maintaining vaccine potency, safety, and effectiveness. Nurses and other health workers are central to maintaining the vaccine cold chain at primary health care level.

Aim:: To assess nurses' knowledge and practices regarding vaccine storage in primary health care centers

Methods: A descriptive cross-sectional was conducted using the available data of 50 respondents. The data contained socio-demographic variables Yes/No indicators related to vaccine refrigerator conditions, temperature monitoring, vaccine arrangement, and inventory practices. Descriptive statistics were summarized as frequencies and percentages as reported in the dataset.

Result

Results: 98.0% of respondents reported that the vaccination refrigerator was located in a cold area and away from direct sunlight, the fridge was opened only when necessary, and fridge door had a properly closed. A temperature-monitoring device was reported by 86.3%. Important gaps were identified in restricting items placed on top of the refrigerator (9.8) placing ice packs/frozen ice cubes in the freezer (29.4%), using a temperature-recording card (39.2%), and arranging vaccines according to sensitivity to light, heat, and cold (9.8%).

Conclusion: The dataset demonstrates strong performance in several basic storage practices but important weaknesses in technical cold-chain management.

Recommendation: Regular competency-based training, standardized temperature documentation, supervision, and periodic assessment are recommended

Keywords : Vaccine storage; cold chain; nurses; primary health care; vaccine handling; temperature monitoring.

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Introduction:

Proper storage and handling practices play a very important role in the safety and efficacy of vaccines protecting individuals and communities from infectious diseases. (1) At primary health care level, health workers are responsible for correct storage, temperature monitoring, stock management, and appropriate response to temperature excursions.(2) High-performing primary health care (PHC) is corner stone for achieving universal health coverage. However, in many countries, PHC is poorly and unable to extradite on its potential.(3) Primary health centers that store vaccines have at less functional fridge alternative power sources. emergency plans in the event of mechanic and energy failed like correct temperature monitoring are demandable. staff handling vaccines must be well knowledge on overstocking and transport using ice boxes and ice packs to maintain cold chain. (4) Vaccines display the further costs effective and simplemindedly intervention to protect against disease outbreak. There are mortality and morbidity related benefits derivative from preemptively infectious diseases through vaccination; these also include financial benefits by decreasing number of hospitalize patients, disability and increase community active members.(5) Inadequate storage expose vaccines to heat, freezing, light, or other inappropriate conditions and may consequently reduce vaccine potency. For refrigerated vaccines, the commonly recommended storage has two compartments (the refrigerator) for storing vaccine and diluents, in which the temperature should be kept between °٢C to °٨C, although vaccine-specific product information and guidance should followed.(6) Proper vaccine storage and handling practices play a very important role in the safety and efficacy of vaccines protecting individuals, families and communities from vaccine-preventable diseases. (1) Current CDC guidance similarly identifies vaccine storage and handling as essential components of safe immunization services and emphasizes appropriate storage units, continuous temperature monitoring, standard operating procedures, well Nurses training, and documented management of temperature excursions. (7) Traditional monographs of vaccines focus on defining the vaccine effectiveness or efficacy.(8) Vaccination saves millions of live persons yearly.(9)

Problem Statement

Correct vaccine storage is a critical component of immunization quality. Despite the availability of cold-chain guidance, gaps may occur in refrigerator organization, temperature documentation, monitoring devices, spacing, and placement of vaccines. Assessing nurs-

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es' reported practices provides evidence for identifying areas requiring corrective action and continuing professional education.

General objective

To assess nurses' knowledge and practices regarding vaccine storage in primary health care centers.

Specific Objectives

- To assess nurses' knowledge regarding vaccine storage.
- To assess practices related to vaccine monitoring, refrigerator, documentation, placement and organization.
- To identify gaps in vaccine-storage practices that may require training and supervision.

Material and method

A descriptive cross-sectional, health centers based study, which carried out to assess Nurses knowledge and practice regarding vaccine retreater storage. Conducted in primary health centers (17 centers) in Omdurman rejoin (Althawra). The targeted populations were Nurses working in vaccine handling preparation, administration and storage. Both gender during study period willing to participate (50)A designed structured, self-administered close ended questionnaire was used to collect the data from study subjects. Rational scaling was used (yes, no) items covering refrigerator location, temperature-monitoring equipment, refrigerator organization, vaccine arrangement, temperature checking, and documentation. The data collection tool was questionnaire reviewed by expertise in the field of the study and his comments about content and context was considered. Data were summarized using frequencies and percentages, analyzed by using statistical package of social program (SPSS version 26). The research was respecting the rights of participants. Consent was obtained from all participants after explanation.

Results

Table 1: Socio Demographic Characteristics of Respondents by Nursing at primary health centers

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		Frequency	Percent	Valid Percent	Cumulative Percent
Age	under 25 years old	15	29.4	30.0	30.0
	from 25-45years old	24	47.1	48.0	78.0
	above 45	11	21.6	22.0	100.0
	Total	50	98.0	100.0	
Educational Level	per-university	20	39.2	40.0	40.0
	University	9	17.6	18.0	58.0
	Postgraduate	21	41.2	42.0	100.0
	Total	50	98.0	100.0	
Experience	under 5 years old	35	68.6	70.0	70.0
	from 5-10 years	10	19.6	20.0	90.0
	from 10-20	5	9.8	10.0	100.0
	Total	50	98.0	100.0	

The reported data indicate that 47.1% of respondents were aged 25–45 years, 41.2% had postgraduate education, and 68.6% had less than five years of experience. Percentages and frequencies are reproduced as reported in the supplied dataset; minor denominator inconsistencies are present in the source file and should be checked against the original raw data before journal submission.

Table 2: Vaccine Refrigerator Storage

	Frequency yes	Percent	Valid Percent	Cumulative Percent
fridge placed in a cold area	50	98.0	100.0	100.0
The vaccination fridge away from direct sunlight?	50	98.0	100.0	100.0
the vaccination fridge placed near a power source?	45	88.2	90.0	90.0
Restrict no items placed on top of the fridge	5	9.8	10.0	10.0
the vaccination fridge positioned 15 cm away from the wall?	24	47.1	48.0	78.0
there a temperature monitoring device inside the fridge?	44	86.3	88.0	88.0
there ice packs or frozen ice cubes inside the freezer?	15	29.4	30.0	30.0

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Are water-filled bottles placed at the bottom of the fridge?	25	49.0	50.0	50.0
there a 5 cm gap between each bottle?	12	23.2	24.0	24.0
Is the fridge opened only when necessary?	50	98.0	100.0	100.0
that the fridge door is always properly closed	50	98.0	100.0	100.0
Restrict no food, drinks, or medications stored inside the fridge?	50	98.0	100.0	100.0
temperature monitoring device placed on the top shelf of the fridge?	10	19.6	20.0	20.0

The strongest reported practices concerned refrigerator location, minimizing unnecessary opening, proper door closure, and preventing food, drinks, or medications from being stored with vaccines. Conversely, low percentages were reported for restricting items on top of the refrigerator, maintaining a 5−cm gap between bottles, and several aspects of equipment positioning.

Table : 3 vaccine fridge

	Frequency yes	Percent	Valid Percent	Cumulative Percent
vaccines placed in the fridge according to their sensitivity to light, heat, and cold?	5	9.8	10.0	10.0
vaccines stored in the fridge for longer than a month?	50	98.0	100.0	100.0
there a 5 cm space between each vaccine dose?	35	68.6	70.0	70.0
Vaccine inventory in the fridge compared weekly with the stock list?	50	98.0	100.0	100.0
effectiveness of the vaccines monitored weekly	50	98.0	100.0	100.0
Restrict no vaccines store in the fridge door shelves	50	98.0	100.0	100.0
temperature monitoring device placed on the top shelf of the fridge?	10	19.6	20.0	20.0
the temperature checked every shift?	50	98.0	100.0	100.0
there a card installed to record the temperature?	20	39.2	40.0	40.0
a vaccine tracking card and digital clock located on the middle shelf?	50	98.0	100.0	100.0

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A marked gap was observed in arranging vaccines according to sensitivity to light, heat, and cold, reported by only 9.8% of respondents. Temperature checking every shift and weekly inventory checking were reported at 98.0%, while only 39.2% reported having a card installed for temperature recording.

Discussion

The study included 50 respondents. Regarding socio-demographic characteristics, 47.1% were aged 25–45 years, 29.4% were below 25 years, and 21.6% were above 45 years. Regarding educational level, 41.2% had postgraduate education, 39.2% had pre-university education, and 17.6% had university education. Most respondents (68.6%) had less than five years of experience.

The findings showed that 98.0% of respondents reported that the vaccination refrigerator was placed in a cold area and away from direct sunlight. Similarly, 98.0% reported that the minimizing refrigerator opening, open only when necessary, the door was properly closed, and no food, drinks, or medications were stored inside the refrigerator. This support by Vangroenweghe, Frédéric.[10] only 9.8% reported restricting items from being placed on top of the refrigerator. this in line with study done in Ethiopia[11] proper maintenance of the cold chain is vital in maintaining the effectiveness of vaccines in routine immunization A temperature-monitoring device was available inside the refrigerator according to 86.3% of respondents. Water-filled bottles were placed at the bottom of the refrigerator in 49.0%, while only 23.2% reported maintaining a 5-cm gap between bottles. Ice packs or frozen ice cubes were present in the freezer according to 29.4% of respondents. However, important gaps were identified in technical vaccine-storage practices, particularly arranging vaccines according to their sensitivity to light, heat and cold, maintaining appropriate spacing, use of water-filled bottles, and proper temperature-recording procedures, only 9.8% of respondents reported that vaccines were placed in the refrigerator according to their sensitivity to light, heat, and cold, indicating a substantial gap in this aspect of vaccine-storage practice. In contrast, 98.0% reported checking vaccine inventory weekly against the stock list, monitoring vaccine effectiveness weekly, and restricting vaccine storage in the refrigerator door shelves. Regarding temperature monitoring, 98.0% reported checking the refrigerator temperature every shift. However, only 39.2% reported having a card installed for recording temperature. A vaccine tracking card and digital clock were reported to be located on the middle shelf by 98.0% of respondents.

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8. Conclusion

The assessment identified generally strong reported performance in several basic vaccine-storage practices in primary health care centers, particularly refrigerator placement away from sunlight, minimizing unnecessary opening, proper door closure, avoiding food and medications in the refrigerator, weekly inventory checking, and routine temperature checking. Nevertheless, important gaps were observed in technical aspects of cold-chain management, including vaccine arrangement according to sensitivity, temperature documentation, refrigerator organization, and spacing

Recommendations

• Provide regular competency-based training for nurses on vaccine cold-chain management and vaccine-specific storage requirements.

• Use a standardized vaccine-storage checklist during routine supervisory visits.

• Reinforce correct vaccine arrangement according to manufacturer and national immunization guidance, including protection from inappropriate heat, freezing, and light.

• Strengthen documentation of temperature readings and procedures for managing temperature excursions.

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