Healthy Tadulako Journal (Jurnal Kesehatan Tadulako)
Vol. 11 No. 1, January 2025
P-ISSN : 2407-8441/e-ISSN : 2502-0749

Original Research Paper

Evaluation of Logistics Management for Basic Immunization Vaccines at the Pharmaceutical Installation, South Sorong District Health Office, Southwest Papua

Handara Graha Pasaribu*, Nilawaty Uly, Achmad R.Muttaqien Al-Maidin,Zamli

Master of Public Health, Universitas Mega Buana Palopo

Email Corresponding:
Handarapasaribu1985@gmail.com

Page : 88-96

Keywords:
Processing, storage, distribution

Article History:
Received: 2024-07-28
Revised: 2024-12-05
Accepted: 2024-12-30

Published by:
Tadulako University,
Managed by Faculty of Medicine.
Email: healthytadulako@gmail.com
Phone (WA): +6285242303103
Address:
Jalan Soekarno Hatta Km. 9. City of Palu, Central Sulawesi, Indonesia

ABSTRACT

Background: Pharmaceutical services are direct and responsible healthcare services aimed at ensuring optimal therapeutic outcomes and improving patients' quality of life. Pharmaceutical personnel play a crucial role not only in vaccine production but also in the management of vaccine logistics, including storage, distribution, and administration. Vaccination is estimated to prevent two to three million deaths annually from vaccine-preventable diseases such as diphtheria, tetanus, pertussis, and measles across all age groups. **Objective:** This study aims to evaluate the management of vaccine logistics at the Pharmaceutical Installation of the South Sorong District Health Office in Southwest Papua, Indonesia. **Methods:** This research employed a qualitative approach using in-depth interviews with key informants and applied inductive thematic analysis to interpret the data. **Results:** The findings reveal that although vaccine management practices have been implemented adequately, several challenges remain. These include limited internet connectivity, poor road infrastructure, and logistical delays, all of which hinder the efficiency and effectiveness of vaccine distribution. **Conclusion:** Strengthening infrastructure and improving digital systems are essential to enhancing the effectiveness of vaccine logistics management. Strategic efforts are needed to overcome these operational barriers to ensure consistent and equitable vaccine availability in remote regions.

Introduction

Pharmaceutical workers,pharmacist, and pharmacist assistants are required to improve the quality of their pharmaceutical care with a focus on improving the quality of life of patients. Pharmaceutical services are currently changing from drug management to overall patient care, with a focus on pharmaceutical care to improve the quality of life of patients. Pharmaceutical care is a direct and responsible service to patients related to pharmaceutical treatment with the aim of achieving definite results to improve the quality of life of patients[1].

All tasks related to pharmaceutical preparations, including procurement, production, distribution, dispensing, and service, must be performed by health personnel who have the expertise and authority to do so, according to Government Regulation No. 51/2009. Pharmacists, assisted by pharmaceutical technical personnel, are medical personnel who are competent in the field of pharmacy. Pharmaceutical services consist of two parts, according to Permenkes No. 74/2016: pharmaceutical preparation management and clinical pharmacy services. Human resources, facilities and equipment must support these two components to keep patients safe[2].

Pharmaceutical services include the management of Pharmaceutical Supplies and Consumable Medical Materials; prescription review and services; provision of drug information; and monitoring of drug side effects. To provide these services, standards are needed to ensure the quality of service[3].

Pharmaceutical workers, including

pharmacists and pharmaceutical technicians, contribute to improving the quality of health services and pharmaceutical services. As is well known, pharmaceutical workers play an important role in vaccine manufacturing and other pharmaceutical services, such as the use, distribution and storage of vaccines to be used. As a result, vaccination can help people who have been vaccinated connect with those who also want to be vaccinated[4]. Among other health methods, immunization is the most effective and efficient. Immunization builds immunity to fight diseases[4].

Immunization is the process of increasing a person's immunity to disease. Every year, vaccinations can protect the population from dying from diphtheria, tetanus, pertussis, and measles. Immunization can prevent two to three million deaths each year. Despite this, complete basic vaccinations have not been given to an estimated 19.4 million infants worldwide. Worldwide, the number of people who have received vaccines has remained stable at 86% in recent years. One of the ten countries that have about 60% of these infants is Indonesia[5&6].

Vaccination has been considered one of the triumphs of medical research. Immunization not only prevents the spread of infections in children, but also provides protection that lasts a lifetime. In order to achieve the maximum goal, the processing and availability of sufficient quantities, quality, and timely vaccines are necessary, because vaccines are biological components that have certain characteristics and require special handling of the vaccine chain[7].

To reach the immunity threshold, the initial vaccination is the basic immunization. The types of vaccines used for complete basic immunization include Hepatitis B vaccine, Bacillus Calmatte Guerin vaccine, DPT-HB-HIB vaccine, IPV vaccine, Polio vaccine, and MR vaccine. Vaccines are biological drugs that create immunity by incorporating germs, parts of germs, or germ toxins that have been killed or weakened. Sensitivity to temperature, exposure to sunlight, and air humidity affect vaccine storage. Freeze-sensitive vaccines include hepatitis B, DPT-HB-Hib, DPT-HB, IPV, DT, TT and Td. Inadequate vaccine storage can lead to post-immunization adverse events when used in health facilities[8].

Within the scope of the South Sorong District Health Office, the management of immunization vaccine logistics sometimes experiences delays and stock vacancies of immunization vaccines, this of course can have an impact on vaccine needs in Puskesmas service units that require these vaccines. In every health care facility, the administration of immunization vaccines is well scheduled every month, therefore the availability of immunization vaccine logistics at the health office must be well available.

The immunization program management system includes planning, implementation, vaccine cold chain management, recording and reporting, and technical supervision and training. For an immunization program to run smoothly and successfully, all parts, including vaccine management, must work together. The purpose of vaccine management is to oversee vaccine administration and quality. A stable temperature, no vacancies, no vaccine that is damaged or has passed its expiration date, and records and reports that are directly accessible to the manager are all signs of good quality vaccine management[9].

To ensure the quality of pharmaceutical preparations, the distribution process must be carried out in accordance with applicable regulations. Vaccine distribution must be carried out in accordance with applicable regulations to ensure that vaccine quality remains high and provides optimal immunity to the target. Maintaining the right temperature is important during distribution. The equipment used to carry the vaccine must be kept cool during distribution. The temperature of the

container in which the vaccine is distributed is very important and must be observed. The temperature should stabilize between 2oC and 8oC to keep the vaccine in a stable condition. If the temperature of the container is less than the standard, the vaccine cannot be used. To maintain vaccine quality during transportation, pay attention to the usage rules for cold/cool boxes, vaccine carriers, cold/cool packs, and cold/cool pack thermoses[10,11&12].

The purpose of this study was to collect information about logistics processing at the South Sorong District Health Office Pharmacy Installation.

Materials and Methods

Research Design

This study employed a qualitative research design using a formative approach aimed at obtaining in-depth insights into individuals' perceptions and experiences regarding vaccination logistics management. The study was conducted at the Pharmacy Installation of the South Sorong District Health Office in Southwest Papua, Indonesia, during the period of May to June 2024.

Sample

Participants in this study were selected using purposive sampling based on specific inclusion criteria. Selected informants were considered to have comprehensive knowledge and experience related to the management of vaccination logistics. They were also expected to be trustworthy sources of information relevant to the study objectives. The sample consisted of one Head of the Pharmacy Installation, three staff members of the Pharmacy Installation, and six vaccination officers from community health centers (*Puskesmas*), totaling ten participants.

Data Collection Techniques

Data were collected through in-depth, semi-structured interviews with key informants. This technique enabled the researcher to explore the participants' perspectives, experiences, and challenges in managing vaccine logistics. Interview guides were used to ensure consistency across sessions while allowing for open-ended responses.

Data Analysis Techniques

Data analysis was conducted using an inductive approach, allowing themes and patterns to emerge naturally from the data without relying on predetermined categories. The analysis process involved three key stages: data reduction, which focused on selecting and simplifying raw data; data presentation, where the information was organized and interpreted in narrative or tabular form; and conclusion drawing and verification, in which final interpretations were made by identifying recurring patterns and ensuring the validity of findings through triangulation.

Ethical Consideration

Although formal ethical approval was not required for this study, ethical principles were upheld throughout the research process. Informed consent was obtained from all participants, and they were assured of the confidentiality and anonymity of their responses. Participation was entirely voluntary, and participants had the right to withdraw from the study at any time without consequences.

Results

The results of this study are presented in four main themes based on the stages of vaccine logistics management: planning, procurement, storage, and distribution. These themes were identified through in-depth interviews with key informants, including the Head of Pharmacy, pharmacy staff, and immunization officers at the Puskesmas. Each theme highlights the roles and responsibilities of the informants as well as the challenges encountered in the vaccine logistics process. The findings are organized into tables summarizing the interview results to provide a clear and comprehensive overview of

how vaccine logistics are managed at the Pharmaceutical Installation of the South Sorong District Health Office.

Characteristics of informants

In table 1. There were 10 participants in this study, namely 1 key participant as a pharmaceutical head, 3 pharmaceutical staff, and 6 immunization officers at the Puskesmas.

Table 1. Characteristics of informants

Participants	Education	Position
P1(E Y)	Pharmacist	Head of Pharmacy
P 2 (S)	scholar	Pharmacy staff
P 3 (I P)	diploma	Pharmacy staff
P 4 (FS)	scholar	Pharmacy staff
P 5 (MG)	scholar	immunization officer
P 6 (FS)	diploma	immunization officer
P 7 (NM)	diploma	immunization officer
P 8 (EP)	diploma	immunization officer
P 9 (Z)	diploma	immunization officer
P 10 (A W)	scholar	immunization officer

Planning

All activities are organized and overseen by planning to ensure good management supportsthe immunization program. Planning is the process of analyzing and understanding the system and developing ideas and actions to be taken to achieve desired goals.

Table 2 Information from informants The immunization vaccine logistics planning process looks at the planning made by the puskesmas, vaccine planning refers to the cohort book and to prevent vaccine logistics shortages, the South Sorong District Health Office always exceeds 10% of the planning made by the puskesmas.

Procurement

Vaccine procurement can be done independently, through the city/district health office, or through patient requests to the health office. The process of procuring and financing vaccines for immunization programs is carried out by the government in accordance with statutory regulations.

Table 2. Planning Interview Results

THEME	INFORMANT	INTERVIEW RESULTS
Planning	Head of Pharmacy	The immunization vaccine logistics planning process looks at the planning made by the puskesmas. If there is an inappropriate plan, the puskesmas recalculates and reports. And see the targets in the cohort book and submit a report to the provincial health office.
	Pharmacy staff	The immunization vaccine logistics planning process looks at the planning that has been compiled by the puskesmas, administering immunization vaccines in the field based on the targets in the cohort book, to prevent vaccine shortages due to planning errors, it always exceeds 10% of vaccine logistics.
	Immunization officer	The immunization vaccine logistics planning process is to submit to the Health Office, based on microplanning in the puskesmas work area, if there are babies who are not recorded, of course this will affect the number of vaccine stocks. to prevent miscalculation, the calculation is based on the immunization cohort book and usually the Health Office exceeds 10% of the needs just in case.

Table 3. Procurement Interview Results

TEMA	INFORMANT	INTERVIEW RESULTS
Procurement	Head of Pharmacy	The process of procuring immunization vaccine logistics is based on planning from puskesmas that have been submitted to the provincial Health Office based on needs, obstacles usually receive vaccines from the provincial Health Office that do not match the request.
	Pharmacy staff	Vaccine procurement is facilitated by the central government, for obstacles there are when inputting in the Electronic-based Immunization Logistics Monitoring System application.
	immunization officer	The process of procuring immunization vaccines is based on the planning of the puskesmas, and some are from grant funds, the obstacle obtained in the field is the input of the Electronic-based Immunization Logistics Monitoring System application error due to network constraints.

Table 4. Storage Interview Results

THEME	INFORMANT	INTERVIEW RESULTS
storage	Head of Pharmacy	As for the storage of vaccine logistics as a pharmaceutical installation, it is stored in a licensed or WHO-standard revrigrate with a temperature of 2-8 0C and in accordance with the operational standards for vaccine storage, the obstacle in storage is the problem with the revrigate machine whose voltage goes up and down and also frequent regional light outages.
	Pharmacy staff	Logistics storage is stored in revrigrate with WHO-standard freezer temperatures in accordance with operational standards for vaccine logistics storage. the obstacle faced is a very long power outage.
	immunization officer	The storage of vaccine logistics is stored in a WHO-standard frezer, which is in accordance with Ministry of Health regulations, as for the obstacles experienced, namely damaged / non-cold storage areas, damaged panels that make the storage area no longer cold, and storage temperatures are sometimes unstable due to electricity conditions that usually get blackouts in the region.

In table 3, information from informants on the vaccine logistics procurement process is based on planning from the puskesmas, but there are obstacles when inputting into the electronic-based immunization logistics monitoring system application due to poor network.

Storage

Vaccination logistics must be maintained at a specific temperature to ensure quality from receipt to distribution or administration to patients. Based on Table 4, informants confirmed that vaccine storage utilizes WHO-standardized refrigerators and follows standard operating procedures. However, challenges arise due to frequent electricity outages in the area, which disrupt the cold chain system. These disruptions pose a risk to vaccine potency and effectiveness. Although the health center adheres to storage protocols, limited infrastructure support, particularly reliable

electricity, remains a significant obstacle in maintaining optimal vaccine storage conditions in this region.

Distribution

Distribution of vaccines to health facilities to meet the needs of immunization services according to the type needed, on time, and quality.

In table 5, information from informants, for the distribution of the Health Office will serve according to the request and will be given at the time of the posyandu in the field, the obstacle experienced is the damage to the cold box which results in vaccine damage due to unstable temperatures.

Table 5. Distribution Interview Result

THEME	INFORMANT	INTERVIEW RESULTS
Distribution	Head of Pharmacy	for distribution if it has been signed and approved, in distributing of course in accordance with regulatory standards but there are several obstacles such as unfavorable weather conditions, damaged road conditions, and lack of vaccine storage boxes and if there are obstacles in distribution, it will reschedule.
	Pharmacy staff	distribution of immunization vaccine logistics by the Puskesmas making a request letter and having it signed by the pharmaceutical section, then after that the Puskesmas can take it, as for the obstacles we get are road conditions, weather and officers not in place.
	immunization officer	For distribution, if the request from the puskesmas is in accordance with the request, the health office will serve according to the request and will be given to the target during the posyandu in the field, at the time of distribution it is according to standards and stored in a cold box so that the temperature is maintained, the obstacles obtained are usually vaccine requests experiencing delays in distribution from the Health Office, and there are cold boxes that have been damaged so that the temperature is unstable.

Discussion

Planning

The results of this study indicate that the needs of the Puskesmas drive vaccine logistics planning. This planning should be based on the targets in the Puskesmas working area. The health center calculates the number of targets through posyandu activities in the village or kelurahan. The health office will inform others to recalculate the needs if there are errors in planning. Planning is good enough, but some puskesmas often make mistakes in planning because they use old target data, so when procuring they take from the 10% that the health office increases when requesting to the Center. This is certainly an obstacle in planning, so the health office always overestimates when planning. However, this has a negative impact if the health office uses more target data.

Planning organizes and oversees all activities, ensuring good management supports the immunization program. The process of analyzing and understanding the system and developing ideas and actions to be taken to achieve desired goals is known as planning. In addition, planning helps leaders use the resources at their disposal. Planning for immunization implementation includes determining the number of targets, planning for logistical needs, and planning for funding[13].

Planning is made once a year and discusses all programs about what they want to do. The Head of Puskesmas and the Immunization Coordinator, not all health workers, are involved in this process[14&15].

Equipment

According to the results of the study, the Electronic Immunization and Logistics Monitoring System application is used during procurement, but network problems often cause the application to crash and cannot be used. Vaccine procurement reporting should be increased by 10% and adjusted to the needs of puskesmas to prevent vaccine shortages. The results showed that this stage of procurement did not cause significant problems because it was done as needed. The health office should have a full report to address network issues. Since immunization vaccinations are purchased with grants, the vaccine distribution schedule should start at the district health office, then at the provincial health office, and finally at the central office. This will develop a strategy to ensure that vaccinations are available during the procurement stage.

Vaccine procurement can be done independently, through district health offices, or through requests to health offices. The process of procuring and financing vaccines for immunization programs is carried out by the government in accordance with laws and regulations. In clinics, health centers, and hospitals, the government provides vaccines and logistics for immunization programs[16].

Storage

As the head of the pharmacy department, the Health Office acknowledged that it continues to work on this, and has reported to the leadership that vaccinations should be considered to maintain their quality. received at the Puskesmas had storage problems, such as broken coolers and unstable temperatures, and lack of electricity. Health centers dispose of damaged vaccines, and some health centers receive vaccines that are close to expiration and unused. This is due to a variety of factors, including errors in targeting and reporting that can lead to shortages or surpluses of vaccines that will not be used until they expire.

Point-of-service vaccination management includes properly trained employees, appropriate storage equipment, and proper vaccine management procedures[17]. Vaccines must be stored at a set temperature to maintain their good quality from the time they are received until they are distributed to the next level or given to the patient[17]. Vaccine refrigerators cannot store other items besides vaccines, such as medicines, food, and drinks; however, they can store adequate refrigeration equipment, such as cold bottles. The Indonesian Guidelines for Childhood Immunization state that refrigerators used to store vaccines should not be used to store other items as doing so will compromise the temperature stability of the refrigerator and cause the refrigerator to be opened frequently.One way to maintain vaccine quality in storage is to mark or write the date opened on the vaccine packaging. This indicates the remaining vaccine used[18].

Distribution

The results showed that vaccine distribution was carried out by the health department and of course adjusted to the planning that had been made by the puskesmas previously when requesting it. vaccine distribution experienced several problems such as unfavorable weather and road conditions that were difficult to access to the puskesmas, which was certainly a problem for vaccine distribution to health facilities to meet the needs of immunization services according to the type needed by considering quality and on time.[10]Studies show that the percentage of vaccine decreases during distribution, which is 63%. Distributed to hard-

to-reach areas, vaccines will arrive late, causing damage before use[19&20].

Conclusion

In the process, vaccination logistics planning is tailored to the needs of the health centers, which are based on objectives established through data collection in their working areas. The Health Office exceeds the planning amount to compensate for errors if they occur. Procurement of vaccination logistics is carried out in accordance with the needs that have been planned in advance through Puskesmas reports. During the storage process, there are constraints on electricity conditions, and of course there is a lack of refrigerators to store vaccines. Electricity constraints are also a risk that can cause vaccines to be damaged or unusable. However, weather conditions and the road to the health center hinder the distribution process. At the time of planning, it is recommended that Puskesmas accurately calculate the number of needs so that there is no shortage or excess of complete basic immunization vaccines at a later stage. In the event of an incorrect application, it is expected that there will still be records for manual accountability, which means that manual reporting should be prepared to overcome obstacles arising from the use of the application and stored in the place intended by the government.

Acknowledgments

Thanks to the almighty god who has given the blessing of health so that the author can complete this paper, thanks to the government, especially the health department of the south sorong district, which has given permission to conduct research.

References

1. Ach faruk alrosyidi, kurniasari s. Pelaksanaan standar pelayanan kefarmasian di apotek kabupaten pamekasan tahun 2020. *J pharm sci*. 2020;5(2):55-59. Doi:10.53342/pharmasci.v5i2.180
2. Prihartini et al. Outpatient satisfaction with pharmaceutical sevices at hospital and primary health care in 11 provinces in indonesia peraturan pemerintah n. *J kefarmasian indones*. 2020;10(1):42-49.
3. Hidayah n, sitepu n, hilda, masniah, ulina k. Tingkat kepuasan pasien terhadap pelayanan kefarmasian di upt puskesmas bromo kecamatan medan denai nurul hidayah. *Heal tadulako j (jurnal kesehat tadulako)*. 2023;9(1):27-35.
4. Suni aa, chusun. Gambaran pengetahuan ibu tentang imunisasi rutin pada balita di jakarta timur, jurnal farmasi-qu.2020:vol 7:1-9.jakarta
5. Dwi ghunayanti novianda, mochammad bagus q. Faktor yang berhubungan dengan perilaku ibu dalam pemenuhan imunisasi dasar. *J heal sci prev*. 2020;4(2):125-133. Doi:10.29080/jhsp.v4i2.402
6. Hanifah an, achmad vs, reffita li, et al. Complete basic immunization for babies at the manisa health center. *Int j health sci (qassim)*. 2023;1(3):246-257. Doi:10.59585/ijhs.v1i3.98
7. Rusnoto a, utomo tp, kudus um. H ubungan k omunikasi d an p elayanan k eperawatan. *J ilmu keperawatan dan kebidanan*. 2019;10(2):343-349.
8. Anjani blp, rahmawati c, andini swp, et al. Profil penyimpanan vaksin imunisasi dasar lengkap di puskesmas terdampak gempa bumi lombok tahun 2018. *Lumbung farm j ilmu kefarmasian*. 2023;1(1):28-32.
9. Jihad ff, sediyono e. Pengukuran kualitas sistem informasi administrasi vaksin imunisasi (siavi) di dinas kesehatan kabupaten aceh barat corresponding author : kesehatan kabupaten aceh barat melalui proses permintaan ke dinas

kesehatan provinsi keputusan menteri kesehatan te. 2022;1(1):12-19.

10. Arpen m, rianty lakoan m, farmasi d, kesehatan hermina p. Monitoring distribusi penyimpanan vaksin engerix b pada poliklinik anak di rs x jakarta barat bulan maret 2023. *J ilmu farm dan kesehat*. 2023;1(2).
11. Kasahun aw, zewdie a, shitu s, alemayehu g. Vaccine cold chain management practice and associated factors among health professionals in ethiopia: systematic review and meta-analysis. *J pharm policy pract*. 2023;16(1). Doi:10.1186/s40545-023-00560-1
12. Gelaw a, belyhun y, wondimeneh y, et al. Knowledge and associated factors of healthcare workers on measles vaccine and cold chain management at health institutions in gondar, ethiopia. *Asian pac j trop med*. 2023;16(1):26-32. Doi:10.4103/1995-7645.368019
13. Qamarya n, zamli, hafsah, nopianto, rahmah l.analisis pencapaian imunisasi dasar lengkap di puskesmas.ensiklopedia of jurnal.vol. 6 no.3:18-23 edisi 1 april 2024 http://jurnal.ensiklopediaku.org
14. Harahap d, lubis m. Analisis pelaksanaan program imunisasi dasar lengkap di puskesmas panyabungan jae kabupaten mandailing natal tahun 2022. *J kesehat masy darmais*. 2022;1(1):38-47.
15. Santoso r. Penyimpanan dan distribusi sediaan vaksin di dinas kesehatan kabupaten garut. *Penyimpanan dan distrib sediaan vaksin di dinas kesehat kabupaten garut*. 2021;4(2):1-7.
16. Aisya rahmawaty, dita destiati, defira salwaa putri insani, anida rahma junita. Gambaran manajemen cold chain vaksin di puskesmas kota tasikmalaya tahun 2024. *J kesehat masy indones*. 2024;1(3):68-78. Doi:10.62017/jkmi.v1i3.1224
17. Diana k, ekasandra n, tandah mr. Evaluasi penyimpanan dan pendistribusian vaksin covid-19 di dinas kesehatan provinsi sulawesi tengah. *J insa farm indones*. 2024;6(3):40-52. Doi:10.36387/jifi.v6i3.1657
18. Permatasari sn, zulfa im, rachmawati an. Analisis pengelolaan rantai dingin vaksin di rspal dr. Ramelan surabaya. *Pharmauho j farm sains dan kesehat*. 2022;9(2):1-8. Doi:10.3372/pharmauho.v9i2.6
19. Habibah n, sulistiarini r, aryati f. Evaluasi distribusi dan penyimpanan vaksin di beberapa dinas kesehatan kalimantan timur evaluation of vaccine distribution and storage in several health departments in east kalimantan. Published online 2024:1-3.
20. Verma sk, mahajan p, singh nk, et al. New-age vaccine adjuvants, their development, and future perspective. *Front immunol*. 2023;14(february):1-17. Doi:10.3389/fimmu.2023.1043109