e-ISSN: 2807-6257

Open Access Indonesian Journal of Medical Reviews

[OAIJMR]

https://hmpublisher.com/index.php/oaijmr

Evaluation of Vaccine Stock Management at the Karanganyar Regency Health Service Indonesia

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ARTICLE INFO

Keywords:
Evaluation
Karanganyar health service
Vaccine management

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All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.37275/oaijmr.v4i1.506

A B S T R A C T

Vaccines are very susceptible to damage, so vaccine management requires special handling, this is done to maintain vaccine quality. The aim of this research is to find out the description and evaluate suitability vaccine management at the Karanganyar Regency Health Service (DKK) in 2022 based on Minister of Health Regulation No. 12 of 2017. This research is a qualitative descriptive non-experimental research. These research methods cross sectional by using approach, observation or data collection. The sampling technique uses accidental sampling by reviewing and evaluating vaccine management, which includes planning, procurement, receipt, storage, and distribution at the Karanganyar Health Service. The method used for data collection uses checklist suitability and in-depth interviews with the Head of Installation and pharmacy officers. Vaccine planning is adjusted to the usage index and needs in the previous year using a combined method system top to bottom and bottom up. Vaccine procurement is centralized at the Provincial Health Service, where requests are made by method bottom up. Receiving the vaccine is not immediate drop from the center/province, but the Karanganyar DKK takes the needed vaccines to the Provincial Health Service using the provisions for good drug distribution methods. Vaccine storage and distribution at DKK Karanganyar is in accordance with Minister of Health Regulation number 12 of 2017 and also in accordance with vaccine management guidelines from the Ministry of Health in 2021. Vaccines at DKK Karanganyar are in accordance with Minister of Health Regulation number 12 of 2017 and also in accordance with vaccine management guidelines from the Ministry of Health in 2021, both in planning, procurement, receipt, storage and distribution.

1. Introduction

Vaccines are very susceptible to damage, so vaccine management requires special handling. This is done to maintain vaccine quality. The quality of the vaccine will affect the immune effect produced during immunization, so the vaccine needs to be stored in the right conditions so that the body's immune potential can be maintained. Vaccine quality control for damage needs to be carried out. Quality needs to be maintained from the manufacturing process in the factory until it is delivered to the target. Several factors that need to be considered in cold chain management of vaccines for immunization include facilities or equipment, storage conditions, distribution process, and personnel or resources carrying them. Some storage incidents affecting vaccine quality or decreasing the potential effectiveness of vaccines usually occur during the delivery process. Improper storage and distribution of vaccines can reduce the quality of the vaccine, resulting in a greater risk of immunized children contracting the disease.[1,2]

Vaccine damage can be prevented through proper transportation, storage, and handling of vaccines from the time the vaccine is produced until it is used in health services. At least problems in storage, such as temperature monitoring, really have to be done

correctly because during distribution, the vaccine is exposed to freezing temperatures only around 75%, in transportation only 30%, in district refrigerators 40%, and health center refrigerators only 30%, if less Because of this, the vaccine will easily be damaged and lose its potency. Various tools with very sensitive indicators such as vaccine vial monitor (VVM), freeze watch or freeze-tag as well as time temperature monitor (TTM) can assist officers in monitoring the storage temperature and distribution/delivery of vaccines.[4-6]

Several previous studies have shown that there are still many health workers who do not apply appropriate vaccine storage methods. The results of another study stated that 66.7% of the officers administering vaccines had a tertiary educational background; refrigerators lack thermometers 25% of the time; there is no refrigerator freeze tag as much as 91.7%, vaccine heat sensitive arranged near the evaporator as much as 33.3%; vaccine freeze sensitive arranged away from the evaporator as much as 41.7%, the refrigerator does not have a temperature recording graph as much as 50%; officers carry out monitoring twice a day as much as 41.7%; the refrigerator thermostat was not taped 91.7% of the time; the officer didn't do it maintenance daily as much as 50%; 66.7% of officers did not carry out weekly maintenance and 33.3% of officers did not carry out monthly maintenance. Other research shows that vaccine management at Regency/City Health Offices and Health Centers still has many shortcomings, with three out of six district/City Health Services and 8 of 18 Community Health Centers observed not having their own freeze tag. Ten of the 18 Health Centers do not have generators, even though four of them do not have a 24-hour electricity supply from PLN. Distribution is also still problematic, which can be seen from the uneven supply within one province. Other research shows that the storage, especially of the COVID-19 vaccine in the Pharmaceutical Supplies Installation, is still not fully in accordance with the 2020 Good Medicine Distribution Method regulations and the Decree of the Director General of Disease Prevention and Control No. HK.02.02/4/1/2021 In disease prevention and control in general, 67% accuracy was achieved in storing the COVID-19 vaccine.[7-9]

Vaccine storage, storage temperature, condition of the VVM (vaccine vial monitor) indicator, and refrigerator facilities for complete doses of immunization vaccines are in accordance with the standards of the Republic of Indonesia Health Government Number 12 of 2017. However, the vaccine distribution process is still not appropriate, as the process is carried out by non-pharmaceutical officers with inadequate vehicles.[10,11] The aim of this research is to understand the description of vaccine management and evaluate the suitability of vaccine management at the Karanganyar Regency Health Service in 2022 based on Minister of Health Regulation Number 12 of 2017.

2. Methods

This research uses a descriptive observational design by examining and evaluating vaccine management at the Karanganyar Regency Health Service. Research design with approach cross-sectional, namely research used to study the dynamics of the correlation between risk factors and effects using an approach, observation, or data collection carried out simultaneously at one time. Information collection is carried out with an assistance checklist (questionnaire) and direct interviews with officers in the vaccine management section at the Karanganyar Regency Health Service. The research was conducted on the moon in May 2023 at the Karanganyar Regency Health Service. Ethical clearance was submitted to the Health Research Ethics Committee of Dr. Moewardi General Hospital Surakarta, and recommendations for implementation at the Karanganyar District Health Service were issued in May 2023 with Number 333/III/HREC/2023.

The population in this study is all data related to vaccine management contained in the vaccine management room for one year. The sampling technique uses accidental sampling, while distribution

is by means of direct interviews with source person Health Service officers. This technique not only observes the data presented by the research object but also carries out in-depth interviews with the sources managing the data (informants) so that it is hoped that valid results will be obtained. The samples taken were all data on the planning, procurement, receipt, storage, and distribution of vaccines at the pharmacy supplies installation of the Karanganyar Regency Health Service.

This research uses a checklist for compliance with vaccine management in the Pharmaceutical Supplies Installation according to existing rules/guidelines/regulations, as well as a list of questions and primary data on vaccine supply management activities listed in the Karanganyar Regency Health Service's Pharmaceutical Supplies Installation. The data collection method is carried out by observation or observation using an assistance checklist accompanied by in-depth interviews with vaccine management officers. Analysis of data was carried out using descriptive analysis to describe the data generated and draw conclusions.

3. Results and Discussion

Results of vaccine planning evaluation in Karanganyar DKK

Based on the results of interviews regarding planning the number of targets to be given the vaccine it was obtained from the Information Data Center of the Ministry of Health (PUSDATIN), taking into account the number of targets in the previous year. Vaccine procurement planning is not based on the source of needs from the Health Center alone but on PUSDATIN central data. This is because if the planning for vaccine procurement is only from Health Centers, then the numbers will be small, and Health Centers are regional targets, while PUSDATIN data from the Centers will be more abundant. This is also done to ensure that the Government program vaccine is not only available at Health Centers but also at other private health services such as hospitals, posyandu, and clinics.[12]

Planning is carried out using a combination method, bottom-up and up-to-bottom. The bottom-up method was carried out with the pattern of Health Centers in Karanganyar Regency making applications for vaccine procurement referring to the previous year's use plus 10%, taking into account the number of targets and evaluation results in the previous year. This is in accordance with research that states that planning is carried out by the Health Center, and then the application is submitted to the Department to be forwarded to the Province using the previous year's data and usage index. The second planning method is method up to bottom done by looking at PUSDATIN data from the Center so that data originating from the Health Center is combined with data originating from PUSDATIN, then proposed to the Provincial level and continued to the Center.[13]

Target planning is also based on program needs immunization. At that time, it was programmed by the Ministry of Health; this was because the target coverage for vaccine use, especially for government programs, was adjusted to the coverage from the center. Management from the center is adjusted to the national usage index (IP); for example, 1 BCG vaccine is calculated to have an IP of 3, and so on, according to each type of vaccine. Vaccine planning was also not based on epidemiology at the time but on conformity with government programs in accordance with Minister of Health Regulation number 12 of 2017 concerning vaccine administration programs, both the type and number of vaccines obtained.[14]

Table 1. Results of the suitability of vaccine planning in Karanganyar DKK.

Achievement indicators	Conformity with Minister of Health Regulation Number 12 of 2017
Number of targets	It is in accordance with vaccination guidelines
Planning procedures	A combination of bottom up and up to bottom (according to Permenkes Number 12 of 2017).
Target coverage	Adjusted to government programs regarding vaccination programs
Remaining stock	There is no remaining stock at DKK Karanganyar
Usage index	In accordance with government programs and national needs

The results of this observation are in line with central and regional needs because regional planning originating from the Health Center is all collected, and then the existing data is increased to a greater extent to meet national vaccine needs. Vaccine planning is also in accordance with the government program as stated in Minister of Health Regulation Number 12 of 2017 concerning immunization implementation programs, that is, implementation of complete immunization including BCG, DPTHb Hib, Polio/IPV, and MR immunization (Ministry of Health, 2017). Planning at DKK is not only about vaccine needs, but the logistical needs for administering vaccines are also taken into account, for example, safety boxes, disposable syringes, and others; this is because it is to support the activities of the immunization program. The results of vaccine planning at the Karanganyar DKK are also the same as the results of other studies, which state that management is good. Although it still exists, in terms of management, it is almost the same as DKK Karanganyar, which is already good.

Evaluation results of vaccine procurement in DKK Karanganyar

The results of procurement observations also used source triangulation, using an interview method with the Karanganyar DKK immunization program manager. The results of the procurement evaluation based on interviews with the DKK Karanganyar immunization program manager showed that DKK Karanganyar did not choose suppliers or suppliers of vaccines. Based on the guidelines for vaccine management in health service facilities, procurement is carried out by request from the city or independent district health service, and then the district health service forwards it to the province and then to the center. This process is carried out by making a letter of request or application from a Health Center or clinic, or health service and then forwarding it to DKK Karanganyar. DKK Karanganyar will make a letter of request or application to be submitted to the Central Java Provincial Service. The application time is usually 3 months, 2 months for the waiting time, and 1 month for the speculation time for delays, while for applications from the Community Health Center, it is usually 1 month and 1 week.

Table 2. Results of suitability for DKK Karanganyar vaccine procurement.

No	Aspects examined	Indicator	Conformity with Minister of Health Regulation Number 12 of 2017
1	Supplier selection	DKK does not choose but has been determined by the government, namely PT Bio Farma, Bandung	In accordance
2	Types of immunization vaccines	The vaccine available at DKK Karanganyar is a government program vaccine for immunization	In accordance
3	Fill out the form correctly	The vaccine form ordered is in accordance with the supplier's SOP	In accordance

Suppliers or vaccine suppliers are not selected independently by DKK but are dropped directly by the Ministry of Health, where the pharmaceutical wholesaler or manufacturer appointed by the government is PT Bio Farma, Bandung. After it is sent from the manufacturer to DKK, it is then sent to the health center according to the number of requests sent. This is in accordance with the guidelines for vaccine management services from the Ministry of Health in 2021 and in accordance with PMK number 12 of 2019. This is also in line with other research, which states that the Karanganyar DKK received vaccines originating from PT BioFarma via dropping Provincial DKK.

Evaluation results of vaccine acceptance at DKK Karanganyar

The results of observations of vaccine receipt also used source triangulation, using the interview method with the DKK Karanganyar immunization program manager. Acceptance is an activity to guarantee the suitability of the type, specifications, quantity, quality, delivery time, and price stated in the order letter and/or document. reception, adjust or match the goods received. The receiving process aims to ensure that the vaccine shipments received are correct, come from approved suppliers, have not been damaged, or have not undergone changes during transportation.

Results of interviews with managers of the DKK Karanganyar vaccine stated that the acceptance of the vaccine in drop from the Ministry is received by the Pharmacy section. The pharmacy department will check the completeness of the vaccine received, starting from the suitability of the quantity requested and sent, expiration time, batch number, type of vaccine, the unit price of the vaccine, the total price of the vaccine, completeness of the administrative invoice, quality, and vaccine quality indicators. Archives containing both receipts and shipping invoices from the Provincial Service are kept and managed by the pharmacy section, as is the storage and distribution of vaccines. This is in accordance with the Vaccine Management Guidelines from the Ministry of Health in 2021 and in accordance with PMK No. 12 of 2017.

The reception process is not just receiving the goods but also recording all the vaccines received in the vaccine receipt report and recording them on the stock card at each vaccine storage location. The results of vaccine acceptance in Table 3 are stated to be in accordance with BPOM regulation number 9 of 2019 because all the indicators above were carried out by pharmacy staff.[15]

Table 3. Results of suitability for vaccine acceptance in Karanganyar DKK.

No	Aspects examined	Indicator	Conformity of Minister of Health Regulation Number 12 of 2017
1	Vaccine type	The vaccine received is in accordance with the vaccine ordered. The vaccine received corresponds to the vaccine required.	In accordance
2	Checking the date of receipt	The date of receipt corresponds to delivery	In accordance
3	Date checking expired	The vaccines sent have a date expired	In accordance
4	Vaccine manufacturing factory	Legal vaccine makers comply with the law and have permits	In accordance
5	Batch number checking	The production batch number is listed	In accordance

This recording is carried out to ensure stock conformity between incoming vaccines and outgoing vaccines so that there is no misuse of vaccines. Recording is done either manually or entered into the existing program at DKK Karanganyar to calculate vaccine needs for the following year. The pharmacy department is responsible for ensuring the management of the reception, storage, and distribution of pharmacists. Pharmacists here are tasked with ensuring supervision of the safety, quality, and efficacy of vaccines received by users.

Evaluation results of vaccine storage at DKK Karanganyar

Vaccine storage is an activity that regulates the vaccines received so that they are safe and protected from physical or chemical damage, and their quality is maintained in accordance with the specified requirements until they are used. Vaccines require special storage conditions in accordance with its nature. The vaccine solvent is stored at a temperature range of 2°C to 8°C, while certain vaccines, such as polio, must be stored at -15°C up to -25°C. Storage temperature must always be monitored and recorded on a temperature card that is not far from the vaccine storage area. Deviations from the existing provisions for vaccine storage result in damage to the vaccine, thereby reducing or even eliminating the vaccine's potency. Monitoring vaccine storage temperatures is very important in determining precisely whether the vaccine is still suitable for use or not, vulnerable and easily damaged.

The results of interviews regarding vaccine storage at DKK Karanganyar were conducted with the Head of the UPT Pharmaceutical Supplies Installation at DKK Karanganyar and with pharmacy officers who directly handle vaccine storage in the vaccine room. Several things are done to analyze whether the storage system is in accordance with vaccine management guidelines and Minister of Health Regulation Number 12 of 2017, namely regarding the condition of the refrigerator/freezer/chiller/cold pack, temperature, availability of SOP, thermometer, availability of electricity sources/generators, stock cards and officers.

The results of the interviews show that the vaccine storage area in DKK Karanganyar meets the 2021 Ministry of Health vaccine management guidelines. The placement of refrigerators in DKK Karanganyar has a distance between the refrigerator and the back wall of 10 - 15 cm, with a minimum distance between refrigerators of approximately 15 cm. This is done so that there is optimal circulation between the refrigerators and the refrigerator door can be opened optimally and is not too crowded. The chiller is in the room, so it avoids direct sunlight. Air circulation in the room is quite good because the room is air-conditioned, so temperature and humidity can be

controlled. Each refrigerator unit or freezer uses 1 socket for electricity while also being equipped with an MCB for 2 chillers installed on 1 MCB unit, so this is more effective and safer.

Storage of the vaccine in the refrigerator at a temperature of around 2°C to 8°C while the storage in the freezer is around -15°C up to -25°C. The bottom part of the chiller is placed in a cool pack to retain cold and maintain temperature stability chiller, while for the delimiter-freezer, DKK Karanganyar uses a freeze pack below the meanwhile-ice pack between walls. Each chiller is used to store the same type of vaccine, with a distance of approximately 1 to 2 cm or one arm's distance between each vaccine. This distance can provide space for an internal air circulation chiller so that cold air can be distributed evenly and helps the vaccine maintain a consistent temperature. The refrigerator door is also accompanied by a lock so that when opened and closed again, it "clicks" on the chiller or freezer door.[16]

Table 4. Observation results of vaccine storage conditions in DKK Karanganyar.

Vaccine storage area		**Actual**		**Information**
No	**Rated aspect**	**Yes (1)**	**No (0)**	
1	There is an officer in charge of vaccines	√		
2	Have the officers ever attended training? cold chain		√	Online training is available, but offline training has been proposed for training but is not yet available
3	Cold pack available	√		
4	Cold pack or liquid cold box available	√		
5	Freeze tag or freeze watch available	√		
6	There is a refrigerator or chiller vaccine storage	√		
7	Available vaccine carrier (close tightly, no cracks, and clean)	√		
8	Cleaning SOPs are available at vaccine storage areas	√		
9	There are dial or muller thermometers	√		
10	The thermometer is calibrated once a year	√		
11	Backup chiller available	√		
12	There is a generator or genset available in case of a power outage	√		
13	There is a quarantine area for expired or damaged vaccines	√		
14	Fire extinguishers are available		√	Not yet installed in the vaccine room
15	Temperature recording and VVM chart books are available	√		
16	Vaccine stock cards are available for each type of vaccine		√	Vaccine stock is recorded on the SIM

The results of the interviews were complemented by direct observations at the vaccine storage area in DKK Karanganyar. Based on the results presented show that the suitability parameters for vaccine storage management are in accordance with Minister of Health Regulation number 12 of 2017 and the Ministry of Health's vaccine management guidelines for 2021. Although in Table 4 there are several points that are not appropriate, they have been optimized more than specified. This can be seen as the use of stock cards for each type of vaccine is not available because they are equipped with stock records directly in the available computer system. Own chiller more than 1, making it possible to store the vaccine according to the

type. Vaccine management officers have also carried out training, although it is still an online method due to training offline not being available at the time the research was conducted. APARs or fire extinguishers are actually available in the medicine storage room but have not been installed in the vaccine storage area. According to BPOM Regulation number 9 of 2019 concerning CDOB, fire extinguishers must be available and equipped with fire detection equipment in all cold chain product storage areas, and these devices must be maintained periodically according to the manufacturer's recommendations. It could be said that of the 16 points of suitability indicators for vaccine storage, 3 points are optimized with other forms so that the conformity with Minister of Health Regulation number 12 of 2017 is 81%.

The condition of the refrigerator is said to be standard or good for vaccine storage when stored at a temperature of 2°C to 8°C. Refrigerators are also not used to store salty objects other than vaccines. This is done because if there are objects other than vaccines, the refrigerator will be opened and closed frequently, which will disrupt the temperature stability in the refrigerator. Refrigerator maintenance needs to be done every week or every month, such as defrosting, checking the door density, checking the plug, and cleaning the refrigerator body.[17]

Table 5. Observation results of refrigerator conditions in DKK Karanganyar.

Refrigerator		Actual	
No	**Rated aspect**	**Yes (1)**	**No (0)**
1	There is an officer in charge of the chiller or freezer	√	
2	There is an SOP for maintenance conditions for the chiller or freezer	√	
3	Chiller or freezer maintained / not rusted	√	
4	The temperature on the thermometer chiller or freezer is at temperature 2°C – 8°C and -15 to -25°C	√	
5	Temperature is recorded twice a day and analyzed within the last month	√	
6	The recorded temperature corresponds to what is inside the chiller or freezer	√	
7	Rubber chiller or freezer doors still work fine	√	
8	The minimum distance chiller or freezer with the back wall is 15cm	√	
9	Chiller or freezer not exposed to direct sunlight	√	
10	Every 1-unit chiller or freezer uses only 1 electrical outlet	√	
11	Be found cold-packed in a chiller or freezer	√	
12	The chiller or freezer is always on	√	
13	Maintenance was carried out on the chiller regularly	√	
14	A chiller or freezer equipped with an automatic alarm if the vaccine temperature is stored	√	
15	There are no deep ice flower chiller or freezer (if there is, the thickness should not exceed 2cm)	√	
16	A chiller or freezer not used to store items other than vaccines	√	
17	The freezer tag still shows the check mark	√	
18	Chiller or freezer using TCW 2000 and 3000 types	√	

The refrigerator used in DKK Karanganyar uses a chiller where this tool can store the vaccine temperature at 2 different temperatures, including temperatures 2°C – 8°C and -15 to -25°C. Based on research results. indicates that the chiller in DKK Karanganyar is 100% in good condition. Temperature monitoring on the chiller has been done very well where the guidelines only require a minimum of twice a day for controlling temperature, but in DKK Karanganyar, it is done 3 times a day. The chiller is equipped with an automatic alarm thermometer, which can provide information if the vaccine temperature is not appropriate. When the observation at DKK Karanganyar took place, everything was in

good condition. The chiller, as a place for storing vaccines, is still in good and optimal condition, so it is hoped that the condition of the vaccines at DKK Karanganyar will also still be in good condition.[14]

It is very important to maintain vaccine storage temperature conditions to ensure the temperature complies with vaccine storage guidelines and the type of vaccine being stored correctly. This is done to maintain the efficacy of the stored vaccine. The storage process for cold chain vaccine products must be ensured and stored in a temperature-controlled room, protected from direct sunlight, and the solvent used must also be properly conditioned and stored. Vaccine storage temperatures at DKK Karanganyar are all good. The chiller nor freezer has complied with the provisions of Minister of Health Regulation number 12 of 2017 and the Ministry of Health's Vaccine Management Guidelines for 2021. Storage temperature at the chiller ranges between 2°C – 8°C while the storage temperature at the freezer ranges from -15°C – (-25°C).[15]

Vaccine temperature recording is carried out 3 times a day, morning, afternoon, and evening, whereas according to Minister of Health Regulation number 12 of 2017, it is only required 2 times a day, namely in the morning and evening. This is done by the Karanganyar DKK to ensure that the quality and efficacy of the vaccines are managed to reach the users, in this case, the Health Centers, clinics, and patients. During holidays, temperature recording is not carried out; it is just anticipated with an automatic generator; if there is a power failure, the generator immediately turns on and keeps the temperature maintained, so it is hoped that the variations will not be too big. Solvents and pipettes are stored at room temperature and protected from direct sunlight by storing them separately from the vaccine but kept at a cool temperature below 25°C.

Table 6. Observation results of vaccine storage temperatures at DKK Karanganyar.

Vaccine storage		Actual		Information
No	**Rated aspect**	**Yes (1)**	**No (0)**	
1	Vaccine storage uses a cold chain	√		
2	DPT, TT, TD, Hepatitis, BCG, and measles vaccines at temperatures 2°C – 8°C	√		
3	Polio vaccine at a temperature of -15 to -25°C	√		
4	The layout of the vaccine box has a minimum distance of 1 – 2 cm or 1 finger	√		
5	Heat-sensitive vaccines are placed near the evaporator (BCG, measles, and polio vaccines)	√		
6	Freeze-sensitive vaccines (TT, DT, Hep B, DPTHB, DPT-HB-Hib, Td, IPV) are placed far from the evaporator	√		
7	Vaccines that have been damaged or ED are separated	√		
8	Heat-sensitive vaccines have VVM	√		
9	Not all vaccines with VVM C or D conditions are deep chiller	√		
10	There is no vaccine that the label is missing in the chiller	√		
11	Vaccine arrangement is based on the FEFO and FIFO principles	√		
12	The amount of vaccine available in chiller according to what is recorded on the vaccine stock card	√		Recording vaccine stock cards on the computer/application
13	Vaccine stock recording is always carried out	√		
14	Vaccine expenditure takes into account FEFO, FIFO, and VVM conditions	√		
15	Solvent (dropper with dropper) stored at room temperature	√		
16	There is no coagulation of certain vaccines (TT, DT, Hep B, DPTHB, DPT-HB-Hib, Td, IPV)	√		
17	SOP for vaccine storage is available	√		
18	Vaccine stock control SOPs are available	√		
19	A freezer tag placed between freeze-sensitive vaccines	√		

Based on the results of observations, vaccine storage is still carried out by recording stock cards and is equipped with systemic input on a computer. This is done to ensure vaccine availability and calculate the remaining vaccine correctly. The vaccine storage system is also carried out using a combination of FEFO (first expired first out) and FIFO (first in first out). This is done to ensure that the quality and efficacy of the vaccines stored and distributed later are guaranteed. Based on the observation indicators above, all of the 19 indicators are in accordance, but the physical records have been modified through the system so that it can be stated that 100% of the storage temperature conditions are in accordance with the Minister of Health Regulation number 12 of 2017 and the Ministry of Health's Vaccine Management Guidelines for 2021.

Evaluation results of vaccine distribution in DKK Karanganyar

Distribution is the activity of issuing and delivering vaccines from the Health Service or health service facilities to meet the needs for implementing immunization services according to the type required while still paying attention to quality and on time. Vaccine distribution must be carried out according to standards to ensure the quality, safety, and efficacy of the vaccine to its users. The process of distributing vaccines from the center to the service level must maintain high vaccine quality in order to provide optimal immunity to the target. The vaccine distribution process is an important vaccine chain and needs attention. During vaccine distribution, the temperature in the container used to carry the vaccine must also be taken into account so as to maintain the potency of the vaccine during transportation; the conditions for use of cold/cool box, vaccine carrier, terms cold pack, and cool pack must be considered.[13,14]

Table 7. Observation results of vaccine distribution.

Vaccine distribution		Actual		Information
No	**Rated aspect**	**Yes (1)**	**No (0)**	
1	Vaccine management and cold chain are pharmaceutical workers	√		
2	Drivers who are responsible for transporting cold chain products have received CDOB training		√	Never received CDOB training
3	Written procedures are available that explain the process of sending drugs and/or medicinal substances that are sensitive to vaccine temperature	√		
4	Vaccine delivery is accompanied by shipping documents in the form of a letter of proof of outgoing goods and a vaccine arrival report	√		
5	Cold box/vaccine carrier: Always clean before and after use	√		
6	Cold box/vaccine carrier used in shipping must not be cracked or broken and must be dry	√		
7	Every vaccine distribution must use cold boxes which contain a cold pack	√		
8	Distribution of vaccines in small quantities is carried out separately for freeze and heat-sensitive vaccines	√		
9	Cold pack placed not in direct contact with the vaccine	√		
10	Vaccine distribution is in accordance with FIFO or FEFO	√		
11	Vaccine delivery always pays attention to the vaccine expiration date	√		
12	Vaccine delivery uses containers that have been validated or vaccine carriers that meet vaccine delivery standards	√		
13	There are written procedures for the activities and maintenance of vehicles and equipment involved in the distribution process, including cleaning and safety measures. It must be noted that the cleaning agent used must not have an adverse effect on the quality of the drug and/or drug substance	√		
14	Available equipment used for temperature monitoring during transportation in vehicles and/or containers is always maintained	√		
15	Checks and adjustments are made to the requests of each health center	√		
16	Each vaccine distribution takes into account the maximum stock requirements and vaccine storage capacity	√		

The process of distributing vaccines from DKK to Community Health Centers is rarely carried out smoothly, down from DKK to the Health Center, but often from the Health Center, they pick up the ball to DKK itself. This is done both from the Health Center to the DKK and from the Karanganyar DKK at the Provincial Health Service so that several tools are prepared to maintain the quality of the vaccine during the delivery process. This is in line with research, which states that DKK does not often distribute vaccines to the Health Center but instead takes them directly from the Health Center to the Health Service, both Provincial and Regency/City. Distribution to private clinics is usually done in 2 ways: it can be from DKK to a private clinic if the route taken is in the same direction as the Health Center you want to go to, and sometimes by a pick-up and drop-off method, where the clinic will come to DKK. The results of the interviews show that every process of distributing vaccines in large quantities is carried out using a cold box, whereas if it is a small amount, it will be taken for use as a vaccine carrier.[11,12]

During distribution, if there are two different types of vaccines, such as heat-sensitive vaccines and cold-sensitive vaccines, the containers used are also different. If there are different sensitive vaccines, the one from the taking temperature freezer with storage temperature -25°C to -15°C and temperature 2°C to 8°C, then the storage equipment is either from DKK to the Health Center or from the province to DKK. This is done because if the initial condition of the vaccine is frozen and then it thaws during the distribution process, then the vaccine cannot be frozen again because the quality has decreased, and so has the efficacy. However, the vaccine from the province was frozen and then thawed during distribution, so it was no longer stored in the freezer but at a temperature of 2°C to 8°C. This is because it will affect the expiration period, where automatically, the temperature is 2°C to 8°C compared to freezing temperatures, and the expiration date is faster. To maintain the condition of the initially frozen vaccine, use it to keep it in the frozen ice pack, whereas if the storage temperature is 2°C to 8°C, then equipped with a cold pack.

Frozen vaccine packaging also complies with Minister of Health Regulation number 12 of 2017, which must be equipped with a freezing indicator. The equipment is added free stag for freeze-sensitive vaccine preparations, ensuring that the vaccine is not exposed to freezing temperatures during the vaccine distribution process. The condition of the place used for vaccine distribution must be well maintained and clean in order to maintain the quality of the vaccine brought to the user or patient. The results of the interview above were then adjusted to the actual conditions in the field, where of the 16 indicators of suitability for vaccine distribution in accordance with the 2021 Ministry of Health vaccine management guidelines and Minister of Health Regulation number 12 of 2017, only 1 indicator was not appropriate, namely regarding the driver. However, the conformity of the process with standards is still quite high, namely 93.75%.[11,12]

Qualitative analysis results using the Nvivo method

Qualitative analysis of interview results was tested using assistance software QSR Nvivo. Qualitative research data is very large and can come from many sources with varied data collection techniques. The data sources analyzed are internal research data sources, external data sources, researchers' notes during research, and the matrix framework. One of the most fundamental aspects of qualitative research is the accuracy and consistency of qualitative research. Nvivo is software that works like folders in manual qualitative data analysis techniques, but these folders are much smarter. The results of the Nvivo analysis can be seen in Table 8.

Table 8. Value results percentage coverage.

No	Variable	Indicator	Source	Reference	Percentage coverage (%)
1.	Planning	Number of targets	1	2	7,01
		Number of gifts	1	1	1,46
		Target coverage	1	2	1,59
		Usage index	1	1	1,42
2.	Procurement	Supplier selection	1	2	3,1
		Types of immunization vaccines	1	1	2,58
		Filling out the order form	1	1	1,43
3.	Reception	Vaccine type, date of receipt, expiration date, vaccine manufacturing plant and batch number	1	2	1,30
4.	Storage	Storage	2	15	7,42
		Storage temperature	2	11	9,88
		Storage officer	2	4	2,27
		Storage flow/SOP	2	12	8,21
5.	Distribution	Distribution officer	2	3	2,83
		Vaccine carrier	2	7	10,31
		Vaccine carrier temperature	2	4	6,82
		Vaccine preparation	2	4	6,68
		Long distribution time	2	2	3,42

The table above shows that all variables have value percentage coverage. This means that the informant mentioned a statement or answer from the interview that referred to this variable. Based on the test results, the greatest results were obtained in the planning section, where the largest number in the target number indicator was 7.01%. In procurement, the highest conformity indicator in supplier selection was 3.1%. In the reception, only 2 sources were found with reference to 1 type of indicator at 1.3%. In storage, the temperature indicator for storage suitability was greatest at 9.88%, while in distribution, it was found that the greatest indicator was the vaccine carrier location.

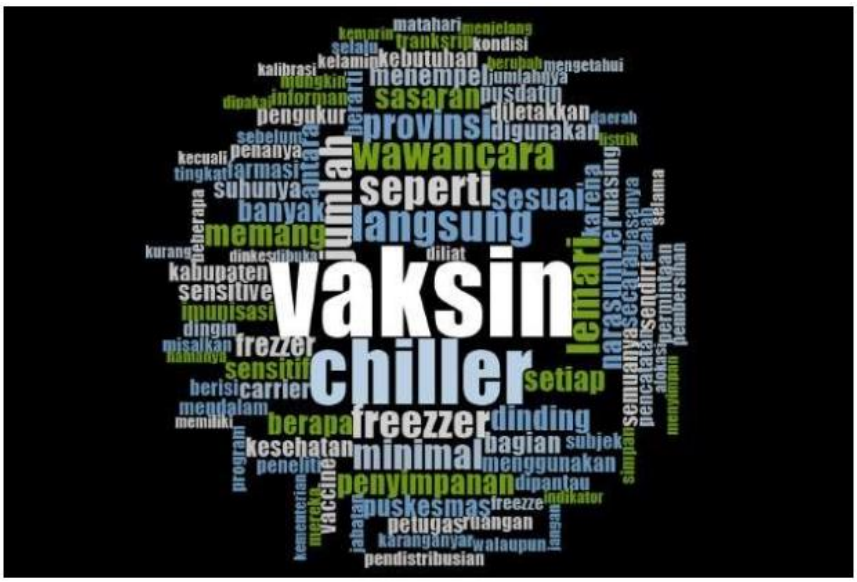

Figure 1. Visualization of words frequently mentioned by informants.

The things mentioned above are indicators that are often mentioned in the interview process, both at the planning, procurement, receiving, storage, and distribution stages. The higher the value percentage coverage on a variable, the more this indicator is often mentioned in the interview process. The next analysis uses a word cloud used to identify keywords. Words that appear frequently are larger than other words. Analysis results using word cloud show that the words that appear frequently are vaccine, chiller, freezer, and storage. The results of this analysis show that, in fact, the management of vaccine supplies has been implemented well, with several keywords frequently uttered by informants. This research was conducted using only qualitative methods and involved informants from vaccine officers at the pharmaceutical supplies installation and vaccine managers at the Karanganyar Regency Health Service.[14,15]

4. Conclusion

Vaccine management at the Karanganyar Regency Health Service is in accordance with Minister of Health Regulation number 12 of 2017, both in planning, procurement, receipt, storage, and distribution of vaccines.

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