Jurnal Kebidanan
UNIVERSITAS MUHAMMADIYAH SEMARANG

Jurnal Kebidanan – Vol 11, No 1 (2022), 89-96
ISSN 2301-8372 (print); ISSN 2549-7081 (online)
DOI: 10.26714/jk.11.1.2022.89-96

Vaccine Cold Chain Management at Puskesmas Level in Semarang City

Dian Nintyasari Mustika[1*], Sherkia Ichtiarsi Prakasiwi[2]

[1,2]Universitas Muhammadiyah Semarang, Indonesia

Abstract

At present, measles is the biggest cause of child mortality among other diseases that can be prevented by immunization. Vaccines are biological elements that have certain characteristics and require special cold chain handling of vaccines since they are produced at the factory until they are used in service units. With the wrong method of storing vaccines, it can cause damage to the vaccine causing AEFI (Post Immunization Adverse Events). Cold chain procedures must be managed properly by keeping vaccines within the recommended temperature range from the transport stage to vaccine storage. The purpose of this study was to determine how the vaccine cold chain is managed at the puskesmas level in the city of Semarang. The design of this research is cross sectional. The samples in this study were vaccine management officers and vaccine storage facilities. The sampling technique in this study was simple random. The sample size is 5 health centers in the city of Semarang. The data was collected by interviewing the puskesmas officers and observing the vaccine storage facilities at the puskesmas. From the results of the study, it was found that there were more respondents who had never received cold chain management training than those who had attended training. To increase the knowledge and skills of immunization officers, it is necessary to conduct training in accordance with the training module for immunization officers.

Keywords: management; cold chain; vaccine

[*]**Corresponding Author:** Dian Nintyasari Mustika (Email: dian.nintya@unimus.ac.id), Villa Tembalang J-$, Bulusan, Tembalang, Semarang, 50277

Introduction

Immunization is an effort to actively induce/increase a person's immunity against a certain disease, so that if one day he is exposed to the disease he will not get sick or only experience mild illness. Several infectious diseases included in PD3I include tuberculosis, diphtheria, tetanus, hepatitis B, pertussis, measles, polio, inflammation of the lining of the brain and inflammation of the lungs. Children who have been immunized will be protected from these dangerous diseases, which can cause disability or death.

Vaccine management can be divided into two groups, namely the classification of vaccines based on antigens and classification based on sensitivity to temperature. McGuire conducted a 2006 study in Pakistan that out of 90 samples of vaccine shipments, 60% of vaccines were exposed to freezing temperatures when carried by the postal service. PATH/UNICEF (2005) conducted temperature monitoring in the cold chain in Bolivia showing freezing occurs at almost every level of every cold chain distribution system, especially during refrigerated storage, of 25 samples 60% experienced freezing, and also during transportation, of 11 100% vaccine shipment samples were frozen.

The cold chain is an interrelated procedure designed to keep vaccines within the recommended temperature range from the point of production to the point of service. Vaccine cold chain equipment is all equipment used in vaccine management to maintain vaccines at a predetermined temperature. In order for the quality of the vaccine cold chain to be guaranteed until the vaccine is received by the target, the following procedures must be carried out, namely storing vaccines and solvents at the right temperature at all levels of storage and service, distribution of vaccines according to procedures in stages to service levels.

Based on the results of the 2020 census, 99.76% of children under five in the city of Semarang have been immunized, where all female children under five have been immunized, while 99.54% of male children have been immunized. The percentage of children under five who have been given mandatory immunization from the government has covered more than 90% except for measles immunization coverage which only reached 73.4%.

Method

The design of this research is cross sectional. The samples in this study were vaccine management officers and vaccine storage

facilities. The sampling technique in this study was simple random. The sample size is 5 health centers in the city of Semarang. The data was collected by interviewing the puskesmas officers and observing the vaccine storage facilities at the puskesmas.

This study used a questionnaire that was used to collect data on puskesmas officers. Data analysis using univariate method, namely by presenting data in tabular form and interpreting research data.

Result and Discussion

An overview of the characteristics of the vaccine cold chain manager at the Semarang City Health Center can be seen from the table below:

Table 1. Distribution of Vaccine Cold Chain Manager Characteristics in Semarang City Health Centers

Variable	Frequency	Percentage (%)
Age		
≤ 35 years old	1	20,0
> 35 years old	4	80,0
Level of education		
Graduated DIII	3	60,0
Graduated DIV	2	40,0
Training experience		
Once	1	20,0
No/Not yet	4	80,0

Primary data, 2021.

From table 1, it is found that the age of the puskesmas staff who administers the vaccine is 35 years as much as 80% and the rest is 35 years. A person's productivity at work is strongly influenced by age. Generally, a person of productive age will be able to work diligently. Even though the age of the officers is quite varied, this does not really affect the management of vaccines at the Puskesmas. Education also plays an important role in this research, in administering vaccines, higher education is needed. In this study, the respondents had taken DIII and DIV education. Education is not significantly related to the performance of vaccination officers. Respondents who have attended training related to vaccine management are 1 respondent or 20.0% and those who have never or have not attended training related to vaccine management are 4 respondents or 80.0%. Respondents who have attended training related to vaccine management are UL/LIL training. By increasing the ability of officers in vaccine management, it will increase the knowledge of officers in vaccine management, so that vaccine storage is

according to standards and can prevent follow-up events after immunization. Participation and duration of vaccine management training will affect the increase in capacity and expertise in vaccine management.

Table 2. Distribution of Vaccine Storage Facilities

Variable	Frequency	Percentage (%)
Vaccine refrigerator		
1. According to SNI & PQS from WHO	2	40%
2. Not suitable	3	60%
Refrigerator models		
1. Open top		
2. Open front	4	80%
	1	20%
Refrigerator system		
1. Compression	2	40%
2. Absorption	3	60%
Vaccine freezer		
1. According to SNI & PQS from WHO	1	20%
2. Not suitable	4	80%
Freezer models		
1. Open top	2	40%
2. Open front	3	60%
System freezer		
1. Compression	1	20%
2. Absorption	4	80%
Tape attached to the thermostat		
1. Yes	3	60%
2. No	2	40%
Cool pack		
1. Available	5	100%
2. None	0	0%
Cold pack/ice pack		
1. Available	5	100%
None	0	0%
Dry ice		
1. Available	4	80%
2. None	1	20%
Temperature monitor		
1. Available		
2. None	5	100%
	0	0%
Continuous temperature recorder		
1. Available	4	80%
2. None	1	20%
Freeze tag/watch		
1. Available	4	80%
2. None	1	20%
VVM		
1. Available	5	100%
2. None	0	0%
Temperature logging graph		
1. Available	5	100%
2. None	0	0%

Primary data, 2021.

Results Based on the research, 2 respondents stated that in their puskesmas there was a vaccine refrigerator according to the Indonesian National Standard (SNI) and Performance Quality and Safety (PQS) from the WHO. For the Vaccine Refrigerator model, 4 respondents stated that they had an open top model, while 1 respondent stated that they had a front open model. A total of 2 respondents used the Absorption system on the Vaccine Refrigerator, 3 respondents used the Compression system.

A total of 4 respondents stated that in their puskesmas there was no vaccine freezer according to SNI and PQS from WHO. For the Vaccine freezer model, 2 respondents stated that they had an open top model, while 3 respondents stated that they did not have a front or top open model. A total of 1 respondent uses a compression system in the Vaccine freezer and 4 respondents does not have a system. A total of 3 respondents stated that the tape on the vaccine frerigerator/freezer thermostat was installed.

All respondents stated that there are cold packs/liquid cold boxes near the evaporator and cold packs/ice packs/frozen cold boxes in their puskesmas. As many as 4 respondents stated that in their puskesmas there was dry ice in the cool pack. Cool pack (cold liquid box) is a rectangular plastic container filled with water and then cooled in the vaccine refrigerator at a temperature of 2° to 8° C for a minimum of 12 hours (near the evaporator). Meanwhile, cold packs are rectangular plastic containers filled with frozen water in the freezer at a temperature of -15° C to -25° C for a minimum of 24 hours. It is recommended that cold packs are no longer used because they are no longer recommended in immunization programs at the district/city and puskesmas levels because of the risk of causing freeze-sensitive vaccines to be damaged.

There are 4 types of temperature monitoring devices, namely analog temperature monitors, continuous temperature monitoring and recording devices, exposure to cold temperatures and VVM. Based on the results of the study, it is known that all respondents stated that there was an analog temperature monitoring device/thermometer in their health center. 4 respondents stated that in their puskesmas there is a continuous temperature monitoring and recording device. In accordance with the guidelines for cold chain management, immunization officers state that cold rooms, refrigerators, cool boxes, vaccine carriers must be equipped with a thermometer to control the temperature when carrying vaccines from the center to the province, from the province to the city and from the city to the

health center until the vaccine is brought to the Posyandu. All these cold chains temperature must be controlled with a thermometer to ensure the quality of the vaccine. Research conducted by Gebbie Prisilliya Lumentut et al at the Tuminting, Paniki Bawah and Wenang Health Centers in the management of the vaccine cold chain did not have a temperature measuring device (thermometer).

A total of 4 respondents stated that in their puskesmas there was a freeze tag/freeze watch to monitor exposure to cold temperatures for vaccines. Freeze tag is a tool used to monitor vaccines against exposure to freezing temperatures. This tool uses an electronic system by displaying a grass sign (V) or a cross (X). If the grass mark on the monitor changes to a cross, it indicates that the vaccine has been exposed to temperatures below -0˚C for more than 1 hour. This study is also in accordance with the research conducted by Maksuk from the Health Polytechnic of the Health Ministry of Palembang on 14 health centers in the city of Palembang in 2011 showed that of the 14 health centers, 5 refrigerators (35.7%) where vaccines were stored in the Palembang city health centers were not available freeze tag in the management vaccine cold chain.

All respondents stated that their puskesmas had VVM as an indicator. VVM is a heat exposure monitoring device used in immunization programs. VVM has several benefits, including giving warnings to officers when to refuse or not to use vaccines, allowing vaccines to be stored or used outside the cold chain and providing instructions on which vaccines should be distributed or used first. All respondents stated that there is a graph of temperature recording in their puskesmas.

Table 3 Distribution of Daily Vaccine Cold Chain Equipment Maintenance

Variable	Frequency	Percentage
Checking the temperature with a digital thermometer/measuring device every morning and evening including holidays		
1. Yes	4	80%
2. No	1	20%
Occurring frost and checking the thickness of the frost? If the thickness is more than 0.5 cm, is defrosting done immediately?		
1. Yes	4	80%
2. No	1	20%
Is there liquid in the refrigerator vaccine? Immediately cleaned/discarded?		
1. Yes	5	100%
2. No	0	0%

Is it recorded directly after checking the temperature on the thermometer or temperature monitor on the temperature recording card every morning and evening? 1. Yes 2. No	5 0	100% 0%

Primary data, 2021.

According to a review of the AEFI report by the Vaccine Safety Committee, Institute of Medicine (IOM) USA, it was stated that most of the most common AEFI incidents were the result of errors in procedures and implementation techniques. So far, there are still many health workers who think that if there is a cooler then the vaccine is safe, some even think that the colder the vaccine the better. But some vaccines are also not resistant to freezing, and can even be damaged permanently in a shorter time than when the vaccine is exposed to heat. Therefore, the distribution of vaccines is known as the cold chain. Before being sent by land or air transportation, vaccines are stored in cold boxes. The process is a long way, because the quality of the vaccine must be maintained from the production site to the smallest health unit (puskesmas) in remote parts of the country. At the provincial and district levels, the cold box is in the form of a freezer or refrigerator. Meanwhile, at the community health center or health units in remote areas, they are already using anti-heat thermos. The application of these procedures to minimize the risk of damage to the vaccine. The problem often faced by health workers is when vaccine distribution reaches posyandu in remote areas. Unfavorable conditions often undermine the quality of vaccines.

Based on the results of the study, it was found that 4 respondents stated that checking the temperature with a digital thermometer/measuring device every morning and evening, including holidays at their health center. 4 respondents stated that there was frost and checked the thickness of the ice and if the thickness was more than 0.5 cm, defrosting was immediately carried out. All respondents stated that at their puskesmas there was liquid in the refrigerator vaccine (1 of them were immediately cleaned or disposed of, while the other 4 had no information). Of all respondents stated that at the puskesmas

they recorded directly after checking the temperature on the thermometer or temperature monitor on the temperature recording card every morning and evening.

Conclusion

From the results of the study, it was found that there were more respondents who had never received cold chain management training than those who had attended training. To increase the knowledge and skills of immunization officers, it is necessary to conduct training in accordance with the training module for immunization officers. By increasing the ability of officers in vaccine management, it will increase the knowledge of officers in vaccine management, so that vaccine storage is according to standards and can prevent follow-up events after immunization. Some health centers have vaccine refrigerators and freezers that are not in accordance with SNI PQS from WHO. It is hoped that all are in accordance with SNI and PQS from WHO so that the vaccines that are brought have conditions that remain of the same quality as in their initial conditions.

References

Pusat Pendidikan dan Pelatihan Tenaga Kerja, (2014), Buku Ajar Imunisasi

H.I Satari, (2016), Penanganan, Rujukan dan Pembiayaan KIPI Vaksinasi Covid-19

Kementrian Kesehatan Republik Indonesia, Modul Pengelolaan Rantai Dingin Vaksin

Kementrian Kesehatan Republik Indonesia, 2020, Petunjuk Tehnis Pelayanan Imunisasi pada Masa Pandemi Covid-19

Kemenkes RI. (2013). Peraturan Menteri Kesehatan Nomor 42 Tahun 2013 tentang Penyelenggaraan Imunisasi. Kementerian Kesehatan Republik Indonesia. Jakarta.

KPC PEN, (2020), Buku Saku #Infovaksin

Madeppungeng M, (2018), Buku Panduan Prosedur Vaksinasi

Oktafany dkk, (2019), Jurnal Pengabdian Masyarakat Ruwa Jurai, Penyuluhan tentang Pentingnya Rantai Dingin (Cold Chain) dalam Mencegah KIPI pada Tenaga Kesehatan di Puskesmas Tanjungsari Lampung Selatan

Maksuk, (2011), Jurnal Kesehatan Poltekkes Palembang, Pengelolaan Rantai Dingin Vaksin Tingkat Puskesmas di Kota Palembang Tahun 2011

Badan Pusat Statistik Kota Semarang. (2020). Profil Kesehatan Kota Semarang. Semarang. https://semarangkota.bps.go.id/publication/2021/09/10/1b8176abf6fbab0460a52923/profil-kesehatan-kota-semarang-2020.html