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## The Pattern of Vaccine Storage at Teritory Hospital in Padang City

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### ABSTRACT

*Teritory Hospital is one of the public services that is close to society and has a purpose to improve public health. Immunization through a vaccines is one of the services tha served by Teritory Hospital. Vaccine is very sensitive and it must be handled with care and need supervision in storing. This reasearch was purposed to know the type of vaccine's storage unit, temperature condition, and condition for safekeeping. This research used qualitative method (description type) with observation technique by giving observation form in 22 Teritory Hospital in Padang city based on WHO, CDC, and Indonesian's Health Ministry vaccine storage guidelines. The result showed, first most of Teritory Hospital in Padang city already had complied the vaccine storage unit based on the guidelines. Second, most of Teritory Hospital in Padang city already had complied the storage temperature condition based on the guidelines. Third, most of the Teritory Hospital in Padang city already had complied the condition of storing based on the guidelines. Most of the Teritory Hospital in Padang city already had complied vaccine storage unit, temperature condition, and the condition of storing based on the guidelines.*

**Keywords:** vaccine, immunization, storage, teritory hospital.

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### INTRODUCTION

Health Center is one of public service that close to society. The definition of Territory Hospital in PERMENKES no. 75, 2014 is one of health facility that increasing health of people. This activity is to maintain, to increase, and also to cope with care about problems of health that aim to family, group, and people. The development of health by Territory Hospital is aim to make the people have 4 characteristic: (1) have awariness and willingness of health behaviour; (2) get high quality of health service; (3) live in healthy domain; (4) have an optimal health degrees [1].

One of service of Territory Hospital is immunization. Immunization is a health service which has aim to increase the immunity. Way of immunization is by taking live attenuated and inactive microorganism, and also modification microorganism inside our body. The live attenuated, inactive, and modification microorganism is also known as vaccine [2, 3, 4, 5, 6]

The vaccine need a serious attention in case of storing system. The primary cause is sensitivity. Vaccine is very sensitive with temperature. Storing the vaccine in out of storage range temperature can damage the potential of it self. Another reason why the vaccine need to be handle with care is the vaccine need a serious attention in storing procedure. Such as, the storage machine, supporting of storing tools, placement, the condition of refrigerator and freezer, and etc [7, 8, 9, 10, 11, 12, 13]. There are so much incidents that cause of vaccine storing system.

In 2002, Gazmarian et al., have studied about storing of vaccine. The result showed that 721 samples in primary care physician (PCP) have storage the vaccine in rack of door of the refrigerator fo 20.3% and 13% for freezer.

Then, 11.1% of refrigerator and 15.5% of freezer hasn't had thermometer. And 3.6% of refrigerator and 3.9% of freezer have stored food and biological material in vaccine storage [14].

Then, the studied that have been done by Bankole et al., in 2009 showed that there are 90% of 1000 samples of health facilities refrigerator is not in good condition for storing of vaccine. Then, 20% of samples hasn't had thermometer. Then, not a single of health facilities have the temperature chart at the refrigerator. And, only 58.2% of samples that storing the vaccine in class 3 and 4 of VVM (Vaccine Vial Monitor) [15].

Other study by Arsalan et al., in 2014 showed that the vaccine has been stored above 8°C for 38.52%, and below 2°C for 1.58%. Then, 71.27% of samples has stored the vaccine below -15°C in freezer. Even this study has showed about 59.89% of refrigerator samples hasn't followed the standard of vaccine's storage temperature, and also the freezer samples for 28.73% [16]. And the study that has been published by Karinagannavar et al., in 2013, showed that only 8.3% of 53 primary health care (PHC) that has generator [17].

Another study by Rahmah in 2014 showed that 76.2% of 21 Territory Hospital in Padang city that has stored the vaccine in the right range temperature (2° – 8°C). Then, there are 23.8% of samples hasn't stored the polio vaccine not in right place, and also the DTP, DT and hepatitis B vaccine for 28.6%. Then, only 42.9% of samples that put thermostat between the vaccines. Then, there are 47.6% showed that the refrigerator not only used for storing of vaccines, not using a special electrical plug, and also the placement of vaccine still close to each other. And, the study showed that only 23.8% of samples that hasn't had coolant packs ≥ 4 units. And also, there are 8 Territory Hospital (38.1%) that hasn't had temperature chart and temperature logat the refrigerator. In the conclusion of this study is there are 38.1% of Territory Hospital that have a bad condition of vaccine storing system [18].

In the conclusion, there are so many procedural error in storing of vaccine and also there are limited storage equipments that causing a non standard storing system. So, the researcher need to do the observation about the vaccine storing profile in Territory Hospital in Padang City. And the aim of this reasearch are to know the type and equipments of vaccine's storage unit, temperature condition, and condition for safekeeping.

## MATERIALS AND METHODS

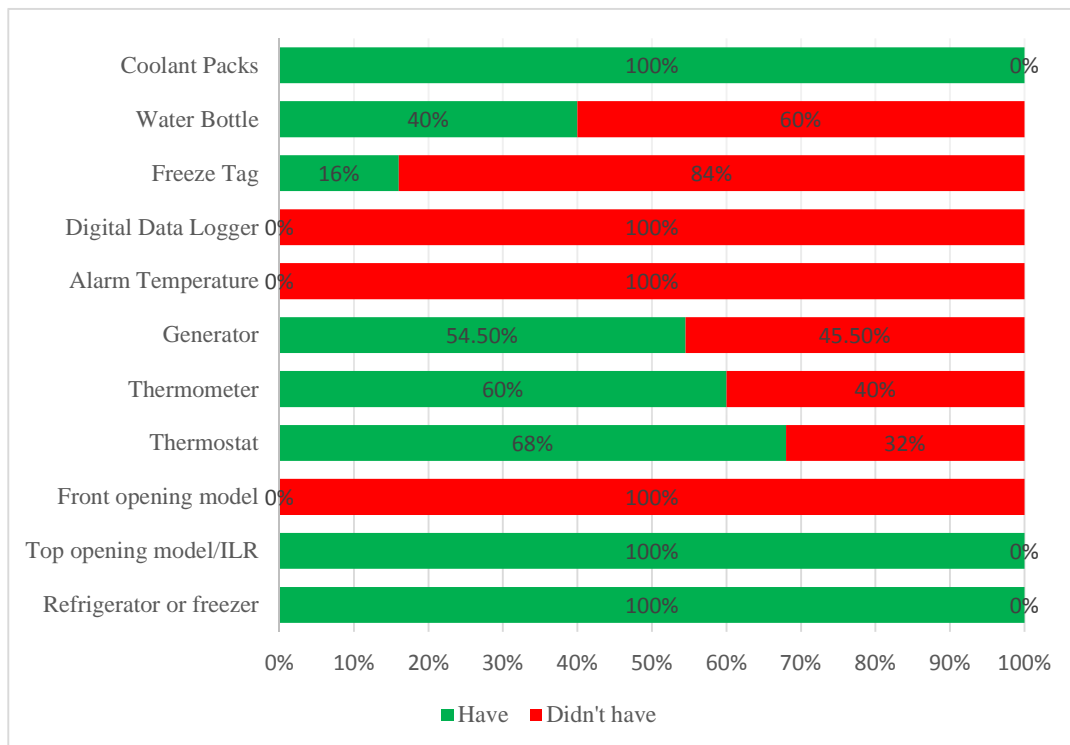
This study using qualitative method and descriptive mode to describe the profile of immunization vaccines storing of Territory Hospital in Padang city. This study observed about 22 Territory Hospital in Padang city. The name and the address of the Territory Hospital was collect from Statistical Corporation Center in Padang city (*Badan Pusat Statistik*). This table was describe about the address of all Territory Hospital in Padang city.

**Table.1 The address of Territory Hospital in Padang city**

No.	Territory Hospital	Address
1	BUNGUS	Jl Raya Padang Painan, Kec. Bungus Teluk Kabung
2	LUBUK KILANGAN	Jl. Ulu Gadut, Kec. Lubuk Kilangan
3	LUBUK BEGALUNG	Jl. Pulau Air 7D, Kec. Lubuk Begalung
4	PENGAMBIRAN	Jl. Pirus Raya, Kec. Lubuk Begalung
5	SEBERANG PADANG	Jl. Seberang Padang Utara I, Kec. Padang Selatan
6	PEMANCUNGAN	Jl. Pemancungan I, Kec. Padang Selatan
7	RAWANG	Komp. Yandul Rawang, Kec. Padang Selatan
8	ANDALAS	Jl. Andalas Ds. Andalas, Kec. Padang Timur
9	PADANG PASIR	Jl. Padang Pasir IV, Kec. Padang Barat
10	ULAK KARANG	Jl. Medan No. 6 Ds. Ulak Karang, Kec. Padang Utara
11	AIR TAWAR	Jl. Merak No. 6 Ds. Air Tawar, Kec. Padang Utara
12	ALAI	Jl. Teuku Umar (simpang Alai), Kec. Padang Utara
13	NANGGALO	Perumnas Siteba, Kec. Nanggalo
14	LAPAI	Jl. Joni Anwar Lapai I Perumnas, Kec. Nanggalo
15	BELIMBING	Jl. Rambutan Raya Perumnas Belimbing, Kec. Kuranji
16	KURANJI	Jl. Raya Kuranji, Kec. Kuranji
17	AMBACANG	Jl. Raya By Pass Km. 8.5, Kel. Pasar Ambacang, Kec. Kuranji
18	PAUH	Gang Irigasi, Kec. Pauh
19	AIR DINGIN	Jl. Air Dingin, Kel. Balai, Kec. Koto Tangah
20	LUBUK BUAYA	Jl. Adinegoro Km. 15, Kec. Koto Tangah
21	IKUA KOTO	Jl. Raya By Pass Km. 17, Kec. Koto Tangah
22	ANAK AIR	Kec. Koto Tangah

There are two techniques to collect data from the Territory Hospital, giving a inquiry form to the immunization personel and observing the vaccine storage unit. Then, this study using 'Emik' and 'Etik' analyzing method to analyze the observation data that has been collected. 'Emik' analyzing method is used to describe the observation

from the source (immunization personel) based on the inquiry form that has been given to them, and the 'Etik' analyzing method is used to describe the data based on the researcher interpretation [19, 20] Then, the researcher compared the observation data with ideal storing vaccine theory to conclude this study.



Graph 1. The type and equipments of vaccine's storage unit at Territory Hospital in Padang city

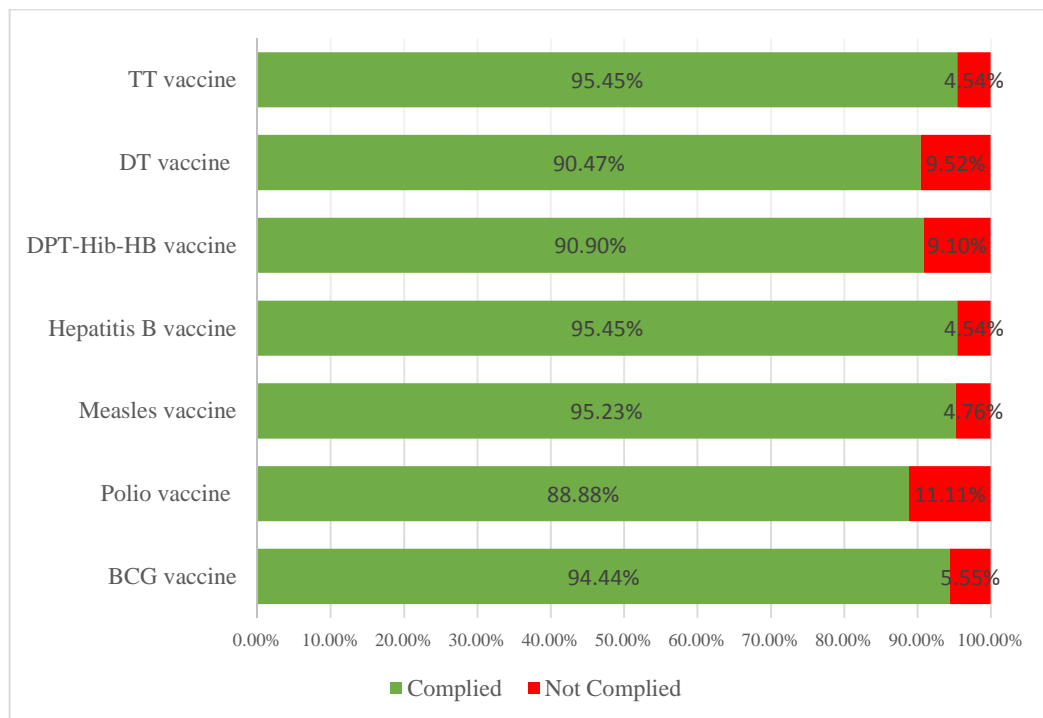
## RESULTS AND DISCUSSION

Table.2 The type and equipments of vaccine's storage unit at Territory Hospital in Padang city

No.	The type and equipments	Have		Didn't have	
		Total	Percentage	Total	Percentage
1	Refrigerator or freezer	26	100%	-	0%
2	Top opening model/ILR	22	100%	-	0%
3	Front opening model	0	0%	22	100%
4	Thermostat	17	68%	8	32%
5	Thermometer	15	60%	10	40%
6	Generator	12	54,5%	10	45,5%
7	Alarm Temperature	0	0%	22	100%
8	Digital Data Logger	0	0%	22	100%
9	Freeze Tag	4	16%	21	84%
10	Water Bottle	10	40%	15	60%
11	Coolant Packs	25	100%	-	0%

Table 3.Vaccine Storing Temperature Condition in Territory Hospital in Padang City.

No.	Standard Vaccine Temperature Range	Complied		Didn't Complied	
		Total	Percentage	Total	Percentage
1	BCG vaccine in 2-8°C range	17	94,44%	1	5,55%
2	Polio vaccine in 2-8°C range	16	88,88%	2	11,11%
3	Measles vaccine in 2-8°C range	20	95,23%	1	4,76%
4	Hepatitis B vaccine in 2-8°C range	21	95,45%	1	4,54%
5	DPT-Hib-HB vaccine in 2-8°C range	20	90,9%	2	9,1%
6	DT vaccine in 2-8°C range	19	90,47%	2	9,52%
7	TT vaccine in 2-8°C range	21	95,45%	1	4,54%



**Graph 2. Vaccine Storing Temperature Condition at Territory Hospital in Padang City**

**Table 4. Vaccine Storing Condition at Territory Hospital in Padang City**

No.	Vaccine Storing Condition	Complied		Not Complied	
		Total	Percentage	Total	Percentage
1	Vaccine that almost expired was placed on front line	23	92%	2	8%
2	The vaccine storage unit door was closed tightly	21	84%	4	16%
3	Vaccine is not placed close to the door of vaccine storage	25	100%	0	0%
4	Vaccine is not placed at the bottom of vaccine storage	23	92%	2	8%
5	Vaccine is not placed at the top of vaccine storage	25	100%	0	0%
6	Vaccine is not stored with food and drink at the same storage unit	25	100%	0	0%
7	Vaccine is not stored with others biologic product at the same storage unit	13	52%	12	48%
8	Vaccine in ampul type that has been opened before, is not stored in vaccine storage unit	25	100%	0	0%
9	The space between the storage with the wall minimal 4 inch	19	76%	6	24%
10	The vaccine storage unit is not exposure by direct sunlight	25	100%	0	0%

There are only one type of vaccine's storage unit that has been used at Territory Hospital in Padang city, that is Ice Lined Refrigerator (ILR) unit. The total of ILR at Territory Hospital in Padang City is 35 units, but only 26 units of ILR were operate for vaccine storing, and only 25 units of ILR that has been permitted to be observed.

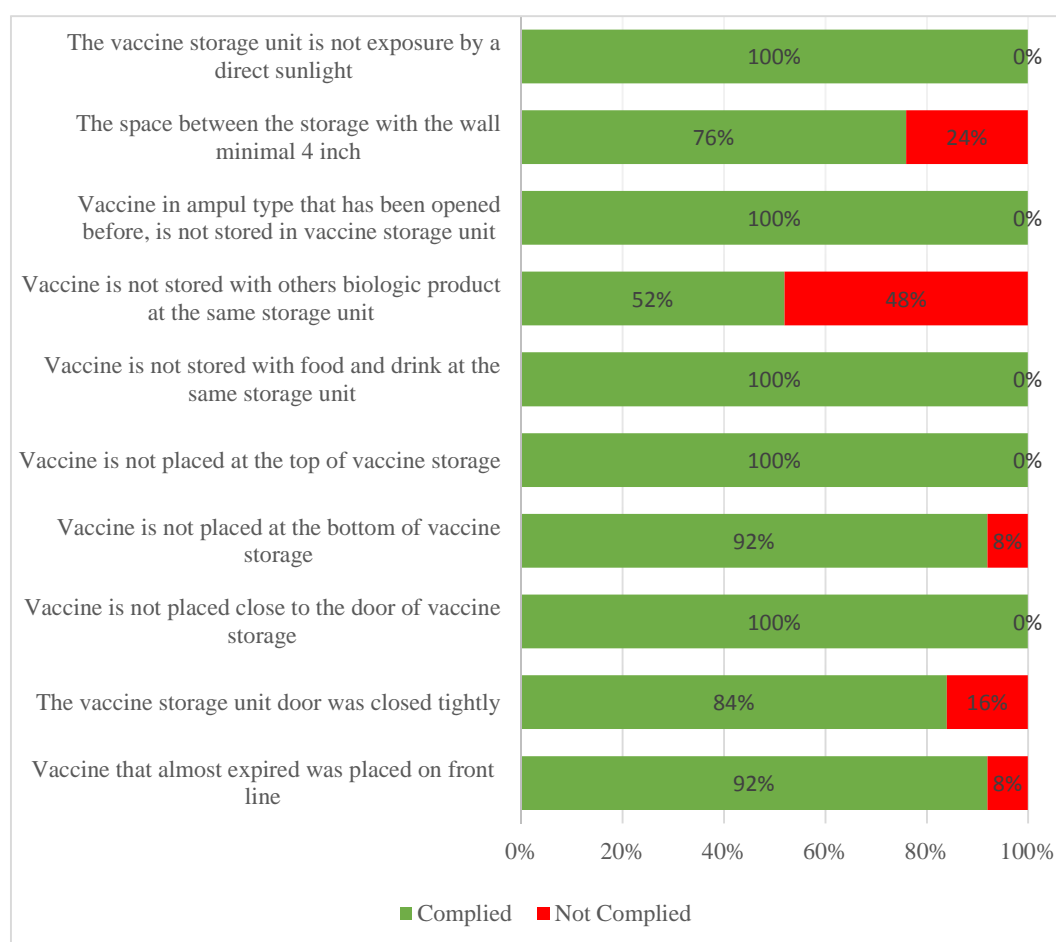
There are 68% of ILR - that have been granted to be observed - have thermostat and 60% for thermometer. Comparing with Gazmarian et al., research, there are only 11.1% for refrigerator and 15.5% for freezer that didn't have thermometer in 721 Primary Care Physician (PCP).

From table 5., and graph 1 showed that only 16% of ILR that has freeze tag. Then, 40% of ILR in Padang's Territory Hospital placed some bottle with water, but all of Padang's Territory Hospital has placed coolant packs at the ILR.

The observation showed that all of Territory Hospital in Padang city has ILR for vaccine storage unit. But, not all of them has all of the equipments for proper ILR vaccine storage. Based on the result, only the coolant packs that have by all Territory Hospital. Some of Territory Hospital in Padang city didn't have generator for generate the electricity in alert conditions such as the electricity has going down or some natural disaster that cut the electricity. This can threat the vaccine to be damaged by heat.

None of a single of digital data logger at the Territory Hospital means no one know the changes of temperature of refrigerator by the times. This makes no one know whether the quality of the vaccines are still good or not. Also

none of a temperature alarm can lead to ignorance of the temperature changes on storage devices out of the ideal storage temperature.



**Graph 3. Vaccine Storing Condition at Territory Hospital in Padang City**

- Vaccine Storage Temperature Circumstances in Padang's Territory Hospital**

In Table 3 and Graph 2 shows that are by and all of Padang's Territory Hospitals has met the requirements to regulate the temperature for storage of vaccines. In AM Territory Hospital, researchers are not granted permission to observe one of the ILR (Ice Lined Refrigerator) containing vaccine BCG and polio. The study findings showed 95.45% of the Territory Hospitals have these types of hepatitis B vaccine and TT at 2 °C - 8 °C and the remaining 4.54% are not in accordance with the specified standard. Then, the findings of the measles vaccine, found as many as 95.23% of storage with the ideal temperature, just as much as 4.76% that do not meet the standards of proper storage. In addition, 94.44% of the 18 Territory Hospitals that store BCG has met the standard storage temperature of vaccines that have been determined, just as much as 5.55% that storage does not correspond to the ideal temperature. Furthermore, 90.47% were also found at the DT vaccine storage temperature is ideal, only amounted to 9.52% which is not appropriate storage temperature. Then also on the observation found that for vaccine storage temperature DPT-HB-Hib does not meet the standards as much as 9.1%, the remaining 90.9% of 22 Territory Hospitals that store vaccines DPT-HB-Hib with a predetermined standard temperature. Furthermore, for the polio vaccine storage temperature is found as much as 88.88% of 18 Territory Hospitals that store the vaccine, just as much as 11.11% that do not fit the standard storage temperature.

Observations indicate that the Territory Hospitals in the city of Padang has met the standard temperature in storing vaccines in storage. Standard WHO (2002) recommended that the standard temperature ranges immunization for vaccine storage at temperatures between 2 °C to 8 °C. This is similar to the instructions in the MOH (2009) which states that the vaccine BCG, DTP-HB, TT, DT, Hepatitis B and Measles stored at 2 °C – 8 °C.

In addition, only two Territory Hospitals that store the vaccines at temperatures below 2 °C. The incidence that found in AD Territory Hospitals that store at -20 °C polio vaccine and AL Territory Hospitals that store all immunization vaccines at a temperature of 1 °C. At the BL Territory Hospital DPT and DT vaccines at temperatures

13 °C in vaccine storage equipment. Therefore, it can be largely explained that the storage profile of the vaccine Territory Hospitals in Padang city views from the appropriate vaccine storage temperatures.

- Vaccine Storage Conditions in Padang's Territory Hospital Kota Padang

Based on Table 4 and Graph 3. of the storage conditions of vaccines in Territory Hospitals Padang city, the conditions of storage of the vaccine has not been fully performed by Territory Hospital in the city of Padang. All Territory Hospitals have been saving vaccines to the conditions, such as vaccines are not stored on the refrigerator or freezer, the vaccine is not stored on the very top, vaccines are not stored with food or drink, and vaccine-shaped open ampoules are not stored back in the storage area.

In addition, 92% of 25 units of ILR (Ice Lined Refrigerator) were observed in the Padang's Territory Hospital, had kept the vaccine conditions such as vaccines that have expired at the front and the vaccine is not stored on the bottom. Furthermore, 84% saving vaccines to the state of the door shut tightly, and the remaining 16% ILR (Ice Lined Refrigerator) were observed storing vaccines in case unclosed door. Tables 7 and Graph 3, also shows that only 48% of Padang's Territory Hospitals which store the vaccine does not coincide with biological products while 52% of all units of ILR (Ice Lined Refrigerator) observed Territory Hospitals in the city of Padang store vaccines in conjunction with biological products. Compared with the findings found in 2002 Gazmararian et al., Which showed that of 721 samples of primary care physician (PCP) is only 3.6% for refrigerators and 3.9% for freezers that store vaccines in conjunction with biological products. Then compared with the findings made by Rahmah in 2014, as many as 47.6% of 21 Padang's Territory Hospitals, the use lemare ice is not only used for vaccine storage only. While the results have been found in 22 Padang's Territory Hospitals with a total of 25 ILR that has been observed, have found as many as 52% of vaccine storage does not coincide with other biological products.

Observations show that all Padang's Territory Hospitals had been saving vaccines to the conditions, such as vaccines are not stored at the door of the refrigerator or freezer, the vaccine is stored not on the very top, vaccines are not stored with food or drink, and vaccine-shaped ampoule open not stored back in the storage area. However, there are several Territory Hospitals that have not been put vaccine that has expired at the front, as happened in R Territory Hospitals and AN Territory Hospitals. Later, it also found vaccine stored at the bottom of the refrigerator, as happened in AN Territory Hospitals and PP Territory Hospitals. Furthermore, it was found a vaccine that is stored with the state of the door is not closed tightly, as happened AN Territory Hospital (because the seal on the freezer door has been detached), LK Territory Hospital (one of the ILR is used to store the vaccine is not sealed), K Territory Hospital, and BU Territory Hospital. Another fact that is found is stored together with vaccine biological products, such as pharmaceuticals, stezolid diazepam rectal tube, dumin rectal tube, blood products (blood of pregnant women), and the purposes of labor. These findings are found in AM, AT, P, UK, BU, PM, L, AN, AL, RA, LK, and KPIK Territory Hospitals.

Then things to consider in storing vaccines in refrigerators and freezers are two in the distance and sun lighting. Standard distance to consider in storing vaccine is 4 inches or more than 10 cm from the wall. Moreover, in terms of sunlighting needs to be given to a storage area placed not too close to the sunlight. The findings of the data on the condition of vaccine storage equipment at the Territory Hospital of Padang city can be seen from Table 4 and Graph 3 of the conditions of vaccine storage tool in the Padang's Territory Hospital.

Table 4 and Graphs 3 showed that 76% ILR (Ice Lined Refrigerator) that successfully meets the standards observed distance between the storage appliance to the wall at least 4 inches or 10 cm, but 24% do not meet those standards. It is found in N, K, UK, B, L, and KPIK Territory Hospitals which put storage devices at a distance of less than 10 cm to the wall. Moreover, all of Territory Hospitals put a storage device that is not exposed to direct sunlight. Therefore, it can be explained that the storage profile of the vaccine Territory Hospitals in Padang city in a good condition and put the instrument appropriately. Additionally, the data showed that all ILR (Ice Lined Refrigerator) were observed already laid the storage device is not exposed to sunlight.

## CONCLUSION

The are three conclusions of this research. First, vaccine storage profile in Padang city Territory Hospitals showed that Territory Hospitals have largely complementary and the type of storage devices based on established standards. Second, the storage profile of the vaccine in Territory Hospitals in the city of Padang showed that Territory Hospitals have largely adjust the temperature of the storage of vaccines based on established standards. Third, the storage profile of the vaccine in Territory Hospitals in the city of Padang showed that largely Territory Hospitals have been adjusting the conditions of storage of vaccines based on established standards.



**Suggestions**

First, the Territory Hospital is to coordinate with the health department for the renewal of the terms of the storage appliance. This needs serious attention so that the tool storage at Territory Hospitals in the city of Padang has met the standard. Moreover, it is necessary the use of simulation tools to support storage of vaccines so that knowledge of how the operation of the vaccine storage in the Territory Hospitals were not found. Second, the health department is expected to provide socialization to the Territory Hospital in the city of Padang on how to store and administer vaccines. This is done to avoid mistakes that basic procedures, such as knowledge of standard temperature for storing vaccines in storage so that the stored vaccines do not lose their potency, and no damage. Third, the conditions of vaccine storage requires awareness of the Territory Hospital and supervisors. It is enabled to address issues such as the state of the door is not completely closed tightly and drugs that save at the vaccine storage, materials or biological products, even food and drinks, which are put together with the vaccine.

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