Pharmacy Education (2023) 23(2) 37 - 41
https://doi.org/10.46542/pe.2023.232.3741

IAI SPECIAL EDITION

RESEARCH ARTICLE

Evaluation of COVID-19 vaccine storage at community health centres in Mataram city

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Keywords
Community health centre
COVID-19 vaccine
Mataram city
Storage

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Abstract

Background: The government of the Republic of Indonesia issued a Regulation of the Minister of Health in 2021 concerning the implementation of vaccination in the context of overcoming the Coronavirus pandemic (COVID-19). Vaccination will be more cost-effective than treatment if evaluated from an economic point of view. A high accuracy of vaccine management in healthcare facilities such as in community health centres (puskesmas) will positively impact the health sector's medical, social and economic aspects. **Objective:** To explore the suitability of COVID-19 vaccine storage at puskesmas throughout Mataram City based on Good Drug Distribution Method (CDOB) in 2020 and the Ministry of Health of the Republic of Indonesia number HK.01.07/MENKES/4638/2021. **Method:** This study was an observational study with quantitative approach. **Result:** The average percentage of indicators of COVID-19 vaccine storage at puskesmas throughout Mataram City were as follows: 1) officers and training (33.3%); 2) buildings (17.8%); 3) facilities (11.8%); 4) operational (78.5%); 5) maintenance (57.7%); 6) calibration, qualification and validation (73.3%), and on the suitability of COVID-19 vaccine storage (92.5%). **Conclusion:** The suitability of COVID-19 vaccine storage at puskesmas throughout Mataram City based on CDOB 2020 and the regulation shows that the average category is 52.1%, which falls into the category of 'not good'.

Introduction

Coronavirus 2019 (COVID-19) is an infectious disease that spreads through droplets and causes respiratory tract infections in humans, ranging from cold and cough symptoms to more serious infections such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) (WHO, 2020). Efforts to overcome COVID-19 continue with other strategies because the long-term COVID-19 outbreak has significantly impacted the economy and social life of large populations. Another more effective and economical intervention to prevent disease transmission is vaccination efforts (Makmun & Hazhiyah, 2020). COVID-19 vaccination aims to reduce the transmission or spread of COVID-19, reduce the morbidity and death rate due to COVID-19, achieve herd immunity and protect the community from COVID-19, all in order to maintain social and economic productivity. Herd immunity can only be formed if vaccination coverage throughout the region is high and evenly distributed. If evaluated from an economic point of view, the provision of a vaccination plan will be more cost-effective than the plan to carry out treatment (Kemenkes RI Dirjen P2P, 2021).

In overcoming the COVID-19 outbreak, the government of the Republic of Indonesia issued Regulation of the Minister of Health 23 of 2021 concerning the Implementation of Vaccination in the Context of Overcoming the COVID-19 Pandemic (Kementerian Kesehatan RI, 2021). The central government aims to implement the COVID-19 vaccination by involving local governments and regency/city governments as well as legal entities or business entities. The COVID-19 vaccine will be distributed to *puskesmas* (the Indonesian term for community health centres), clinics, hospitals, Port Health Offices (KKP), or vaccination service posts

designated as COVID-19 vaccination service places (Kementerian Kesehatan RI, 2021). The types of vaccines used for the vaccination programme by the Indonesian government are the CoronaVac vaccine produced by Sinovac, and the AstraZeneca vaccine produced by the University of Oxford. The vaccine used for mutual aid vaccination (legal entities or business entities bear funding) is the Sinopharm vaccine produced by the Beijing Institute of Biological Product (Kemenkes, 2021).

The accuracy and thoroughness of vaccine management will positively impact the medical, social, and economic aspects of the health sector. Vaccines are very vulnerable products, so careful handling is needed to maintain the quality of the vaccine. For example, the vaccine's effectiveness will decrease or disappear if it is not stored at the correct temperature. The potential for vaccine damage can be prevented by carrying out correct distribution, storage, and management practices (Saputri, 2018).

Previous research that has been carried out regarding the suitability of COVID-19 vaccine storage based on (Good Drug Distribution Methods) CDOB 2020 and the Decree of the Director General of Disease Prevention and Control Number HK.02.02/4/1/2021: those conducted at the Puskesman Karang Pule showed that 80.0% had good suitability for COVID-19 vaccine storage, and those conducted at the Mataram City Pharmaceutical Installation showed that 67.0% were suitable for COVID-19 vaccine storage (Julyasti & Dyahariesti, 2021; Zuhroh & Dyahariesti, 2021). The previous research was only carried out in one health service facility, the *puskesmas* and the Pharmacy Installation in Mataram City. The current study was conducted in all *puskesmas* providing COVID-19 vaccination services in Mataram City by looking at the suitability of COVID-19 vaccine storage based on the 2020 CDOB and (Decree of the Minister of Health of the Republic of Indonesia) the Ministry of Health of the Republic of Indonesia number HK.01.07/MENKES/ 4638/2021.

Methods

Design

Research methods employed descriptive observational with quantitative approaches. The study was conducted at ten *puskesmas* in Mataram City. Researchers and COVID-19 vaccine management officers filled out a checklist of observation sheets by looking directly at the conditions of storage of the COVID-19 vaccine at the health centre, accompanied by data from interviews with vaccine management officers.

Assessment

The observation sheet used in this study was sourced from CDOB 2020 and the Ministry of Health of the Republic of Indonesia number HK.01.07/MENKES/4638/2021 concerning Technical Guidelines for the Implementation of Vaccination in the Context of Overcoming the COVID-19 Pandemic. Seven storage indicators measure COVID-19 vaccine storage from a checklist or observation sheet: officers and training on COVID-19 vaccine management; COVID-19 storage buildings; COVID-19 storage facilities; COVID-19 vaccine storage operations; maintenance of COVID-19 vaccine storage; qualification, calibration, and validation of COVID-19 vaccine storage equipment; the suitability of COVID-19 vaccine storage based on the Ministry of Health of the Republic of Indonesia 2021.

Results

This research has received ethical clearance with number 30/EC-04/FK-06/UNIZAR/V/2022 from the Faculty of Medicine, Al-Azhar Islamic University, Mataram. The average table of percentage indicators of COVID-19 vaccine storage suitability is shown in Table I. The average percentage of suitability for COVID-19 vaccine storage based on the 2020 CDOB and the Indonesian Ministry of Health number HK.01.07/MENKES/4638/2021 at ten Puskesmas in Mataram City is 52.1%, this falls into the category of ‘not good’. The average percentage of COVID-19 vaccine storage suitability is lowest in Puskesmas B and Puskesmas H at 34.1% with the category of ‘not good’, and the highest percentage of suitability is at *puskesmas* D at 79.5% which falls into the ‘good’ category. The average percentage of conformity of the COVID-19 vaccine storage indicator is the lowest in storage facilities at 11.8%, which is in the category of ‘not good’. The highest percentage of conformity based on the Ministry of Health of the Republic of Indonesia in 2021 is 92.5%, which is in the ‘good’ category.

Discussion

The average percentage for officers and training on COVID-19 vaccine storage in ten Mataram City Health Centers is 33.3% with the category of not good because the vaccine management officers in eight *puskesmas* are not pharmaceutical workers, but other health professionals. Based on the 2020 CDOB, the person in

charge of the vaccine warehouse must be a pharmacist who meets the qualifications and competencies of laws and regulations. Suppose the person in charge of the vaccine warehouse cannot carry out their duties within the specified time. In that case, the delegation of duties must be carried out by pharmaceutical technical personnel (BPOM, 2020). However, several health centres coordinate with pharmaceutical personnel in charge of managing pharmacy warehouses.

Table I: Average percentage of COVID-19 vaccine storage suitability indicators

Puskesmas	COVID-19 vaccine storage indicators (%)							Average	Category
	Officers and Training	Building	Facilities	Operational	Maintenance	Calibration Qualification Validation	Suitability Based on the Ministry of Health		
A	33.3%	0%	0%	84.6%	46.2%	100%	100%	52.0%	**Not Good**
B	0%	0%	0%	76.9%	61.5%	0%	100%	34.1%	**Not Good**
C	33.3%	0%	0%	76.9%	38.5%	100%	100%	49.8%	**Not Good**
D	66.7%	88.9%	54.5%	69.2%	76.9%	100%	100%	79.5%	**Good**
E	33.3%	0%	0%	76.9%	69.2%	100%	100%	54.2%	**Not Good**
F	33.3%	0%	0%	84.6%	53.8%	100%	100%	53.1%	**Not Good**
G	66.7%	0%	0%	76.9%	76.9%	33.3%	100%	50.5%	**Not Good**
H	33.3%	0%	0%	76.9%	53.8%	0%	75.0%	34.2%	**Not Good**
I	33.3%	0%	0%	76.9%	53.8%	100%	75.0%	48.4%	**Not Good**
J	0%	88.9%	63.6%	84.6%	46.2%	100%	75.0%	65.5%	**Good Enough**
Average	**33.3%**	**17.8%**	**11.8%**	**78.5%**	**57.7%**	**73.3%**	**92.5%**	**52.1%**	**Not Good**
Category	**Not Good**	**Not Good**	**Not Good**	**Good**	**Not Good**	**Good Enough**	**Good**		

*****Answer score on the observation sheet checklist (answer "yes" = 1; answer "no" = 0) (Julyasti & Dyahariesti, 2021)
*****The total score on each indicator is calculated as a percentage (Arikunto, 2016).
*****The average percentage is categorized with assessment criteria, not good (<60%), good enough (60% - 75%), and good: (>75%) (Julyasti & Dyahariesti, 2021).

Training on vaccine management and routine evaluation is not carried out by all COVID-19 vaccine management officers at ten Mataram City Health Centers. Based on the Ministry of Health in 2021 and CDOB in 2020, training and evaluation need to be carried out for officers involved in implementing the vaccination programme and, programme managers and supervisors by involving programme health training agencies. It is intended to increase the capacity of vaccinators and other health workers involved in implementing vaccination services (BPOM, 2020; Kemenkes, 2021). Knowledge related to the distribution and storage of vaccines is very much needed by vaccine management officers for proper vaccine handling because vaccines are very sensitive products if exposed to hot temperature conditions or freezing temperatures resulting in the vaccine being damaged (Sarmadi & Waty, 2020).

The average percentage for buildings (17.8%) and facilities (11.8%) of COVID-19 vaccine storage in ten Mataram City Health Centers are included in the not good category because only Puskesmas D and J have buildings and special vaccine storage facilities. COVID-19 vaccine storage in eight other *puskesmas* is in one building with a storage area for drugs, files, and other goods, so the list of questions for building indicators and facilities is irrelevant to ask *puskesmas* that do not have buildings and storage facilities for vaccines. Based on the 2020 CDOB, buildings for storing cold chain products must be separated and locked, and equipped with facilities such as room temperature meters, humidity meters, Light Fire Extinguishers (APAR), generators, cold rooms, freezers, and others (BPOM, 2020). Vaccine storage facilities and infrastructure are important things that can support the correct storage of vaccines so that vaccines remain stable and effective (Santoso *et al.*, 2020).

The average percentage for COVID-19 vaccine storage operations in ten Mataram City Health Centers is 78.5% with a good category, but not yet optimal in the good category because all *puskesmas* did not destroy the COVID-19 vaccine themselves but were returned to the Mataram City Pharmacy Installation for destruction. All health centres do not have a special place for damaged

or expired COVID-19 vaccines, and some *puskesmas* do not have a place to quarantine the COVID-19 vaccine. The COVID-19 vaccines stored in ten health centres are Sinovac and AstraZeneca with a storage temperature of 2 - 8°C. According to the 2020 CDOB, vaccine warehouses must have a quarantine area to separate the returned, damaged products for which they will be withdrawn. The destruction was carried out by the person in charge of the facility and witnessed by officers of the Provincial Health Office and the local Food and Drug Supervisory Center (BPOM, 2020).

The average percentage for maintenance of COVID-19 vaccine storage in ten Mataram City Health Centers is 57.7% with a not good category because vaccine management officers monitor the refrigerator's temperature two times a day: morning and afternoon. When cleaned, the vaccine refrigerator body only uses a wet cloth without a dry cloth, the vaccine refrigerator condenser is not cleaned with a soft brush, and maintenance recording is not carried out every week and every month. Based on the 2020 CDOB, temperature monitoring is carried out at least three times a day every morning, afternoon, and evening and must be documented to maintain the temperature in the vaccine storage. The vaccine storage warehouse must be provided with written procedures, cleaning programmes, and documentation of the implementation of cleaning. The cleaning equipment used must be appropriate so as not to become a source of contamination to the vaccine (BPOM, 2020).

The average percentage for qualification, calibration, and validation of COVID-19 vaccine storage equipment in ten Mataram City Health Centers is 73.3% with a good enough category, but not yet optimal in the good category because Puskesmas B and H have not calibrated the COVID-19 vaccine storage equipment, and Puskesmas G has just replaced the vaccine refrigerator. Based on the 2020 CDOB, the equipment used must be calibrated and verified regularly and documented by competent parties so that the vaccine quality remains safe and stable (BPOM, 2020). Calibration of tools is essential to ensure the availability of medical devices according to service standards, quality requirements, safety, benefits, safety, and fit for use (Susana *et al.*, 2020).

The average percentage for suitability based on the Ministry of Health in ten Mataram City Health Centers is 92.5% with a good category, but not yet optimal because Puskesmas H, I, and J do not have temperature monitoring devices on vaccine carriers. A temperature monitoring devices are needed to maintain and monitor the temperature of the vaccine carrier so that there is no increase in temperature which can result in an increase in the Post-Immunization Follow-up Event (KIPI) and reduce the effectiveness of vaccines (Kemenkes, 2021; Lumentut, 2015).

The average percentage of the suitability of COVID-19 vaccine storage based on 2020 CDOB and the Ministry of Health of the Republic of Indonesia Number HK.01.07/MENKES/4638/2021 at ten *puskesmas* in Mataram City is 52.1%, with a not good category because eight *puskesmas* do not have COVID-19 vaccine storage buildings and facilities. Moreover, the competence of vaccine management officers is low and inappropriate, and COVID-19 vaccine management officers do not optimally maintain COVID-19 vaccine storage.

Conclusion

The suitability of COVID-19 vaccine storage at *puskesmas* throughout Mataram City based on CDOB 2020 and the Ministry of Health of the Republic of Indonesia Number HK.01.07/MENKES/4638/2021 shows the average category is not good, with a percentage of 52.1%.

Acknowledgement

This article was presented at the 2022 Annual Scientific Conference of the Indonesian Pharmacist Association. The authors thank all *puskesmas* throughout Mataram City for participating in this study, and also the Research and Community Service Institute University of Muhammadiyah Mataram for supporting this study.

Source of funding

Research and Community Service Institute, University of Muhammadiyah Mataram.

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