

## Convalescent Plasma Inventory Cost Identification as Health Accounting Implementation in the Indonesian Red Cross Blood Transfusion Unit, Lumajang Regency

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### ABSTRACT

Supplies in health organizations are health services. The inventory in this study is about convalescent plasma, which is a supply of health services provided to provide therapy for the recovery of Covid-19 patients. The inventory costs are needed in calculating the cost of convalescent plasma supplies in order to determine whether the applied rates have met the costs incurred in procuring convalescent plasma supplies as a result of the implementation of health accounting. The purpose of this study was to determine the cost of convalescent plasma supplies and to find out whether the dose applied to the patient was sufficient to replace the cost of supplies incurred. This research uses quasi-qualitative method, data collection method is observation, interview, and documentation. The results of this study indicate that the study of the cost of convalescent plasma supplies above can be seen that the inventory cost is influenced by several factors, including donor factors and consumables used. Each plasma donor produced is different. This will affect the cost of convalescent plasma supplies in each bag. With this research, the Indonesian Red Cross Blood Transfusion Unit, Lumajang Regency, applies the calculation of inventory cost per bag on blood component products, mainly convalescent plasma.

Keywords: Consumables, Health Accounting, Inventory Costs



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### INTRODUCTION

Inventory as the main support in carrying out business activities in achieving goals (Umboh & Tinangon, 2021; Rusdianti, Irmadaryani & Kustono, 2022). The inventory classification is differentiated based on the type of business entity. Trading companies only have merchandise inventory for sale to the public (Karongkong, Ilat & Tirayoh, 2018). Inventory as the largest investment in the trading business, is expected from the sale of merchandise inventory to get the profit for the company. While manufacturing companies' inventories are divided into four categories: raw material inventory, auxiliary material inventory, work-in-process inventory, and finished goods inventory (Mei, Kustiningsih & Firdaus, 2021), while service companies do not have inventories of goods to be marketed or sold, the activities of the service business result in the

provision of services to the community (Karundeng, Saerang & Gamaliel, 2017; Siahaan & Prasetyo, 2021). In contrast to service, trading, and manufacturing businesses, supplies produced by health organizations are health service products (Bastian, 2019). The health supply in this study is about convalescent plasma. The supplies are obtained by involving donors as people who donate blood, the Blood Transfusion Unit acts as a producer that carries out the blood donation process, blood banks as inventory; and then distributed to hospitals or patients (Khoiri, Isnaini & Elyuda, 2021). Inventory problems are not only limited to companies or organizations that aim at profit, but are also found in social and non-profit organizations (Hoesada, 2021).

Based on data on the demand for convalescent plasma in the Lumajang district, it is known that there will be a surge in demand in 2020 and 2021. The high demand for convalescent plasma in Lumajang Regency has triggered the government to participate in mobilizing the community to donate convalescent plasma (Kominfo, 2021).

**Table 1. Convalescent Plasma Demand and Fulfillment Reports**

No.	Year	Request	Fulfillment
1.	2020	566	527
2.	2021	1957	1804

Source: PMI Lumajang UTD distribution report

In fulfilling supplies other than donors as basic materials in the process, several very important supporting materials are needed (Indelen et al., 2021; Agustin, Mardiana & Budiono, 2012). All costs incurred in order to obtain inventory can be referred to as inventory costs or are included in the cost of product elements (Suwardjono, 2014). Because determining the cost of blood is a complex activity, all activities in the blood supply process must be taken into account, including maximizing the use of blood or plasma so as to minimize unused or expired blood or plasma, because it will have an impact on the overall cost incurred (Shander et al., 2007).

Several researchers conducted research related to the unit cost of plasma production (FFP) in terms of various aspects. Determined accrued costs for PRBC units in Canadian hospitals related to inventory management, publishing, and product administration (Lagerquist et al., 2017). Mafirakureva et al, to be able to assess the unit cost of blood production in Zimbabwe using the activity-based costing method (ABC). Frozen Plasma Fractionation (FFP) production costs involve all parts, starting from donor recruitment and selection; donation collection; donation testing; processing; storage and distribution; finance and administration, coordination, safety and health, planning; information and research; and overhead of all costs. caused by that part (Mafirakureva et al., 2016). Prioli et al, estimated plasma costs from the perspective of a United States hospital blood donor center, calculated from donor recruitment, donation, processing, disbursing and labeling; ordering and obtaining plasma; administering plasma to patients; and adverse events (Prioli et al., 2016). From the research above, it is not possible to calculate the cost of convalescent plasma supplies.

As a social health service unit, it seeks to be accountable to the community, government, and especially to donors for its activities of collecting and distributing convalescent plasma by transparently implementing inventory costs as accounting implementation in health organizations (Suwardjono, 2014). Health accounting is an activity that cannot be separated from a series of activities, both in the form of complete and simple accounting. which aims to provide information on the management of health organizations appropriately, efficiently, and economically (Bastian, 2019). The cost of replacing convalescent plasma in Indonesia has been determined by the government by Decree of the Indonesian Red Cross Central Management Number 023/KEP/PPP/III/2021. So this is a form of uniformity regarding the cost of replacing the supply of convalescent plasma at UTD PMI in Indonesia. However, in fact, UTD PMI Lumajang in

presenting inventory reports, especially for convalescent plasma, has not calculated the cost per bag globally, so it cannot know whether the rates set are in accordance with the costs incurred.

## METHODS

The research data uses donor data and financial reports for 2020, 2021. This type of research uses a Quasi-Qualitative approach. This research places the discussion of philosophy and research paradigms in the initial chapter (Bungin, 2020). The focus of this research is accounting studies in health organizations to identify the cost of convalescent plasma supplies (explaining the treatment of cost identification in determining the convalescent plasma supply in the Blood Transfusion Unit of PMI Lumajang Regency). Quasi qualitative method using 14 stages: 1. Searching for the problem, 2. Literature Review, 3. Identifying Gaps, 4. Developing Hypotheses, 5. Planning Data Sources, 6. Developing Data Collection Methods, 7. Using Theoretical Framework, 8. Data Collection, 9. Keeping a Dairy and Transcript, Coding, Themes, Categorization, and Memos, 10. Trying to Find New Sources of Informants, 11. Triangulation, 12. Constructing Theory, 13. Confirmation Theory Constructing a New Theory.

## RESULTS AND DISCUSSION

The results of the study obtained data in the field through reports generated from the Blood Donor Information System, or SIMDONDAR, and the financial information system used by UTD PMI Lumajang Regency. The process of procuring convalescent plasma goes through several stages, namely the procurement of donors, including recruitment, collection of donors, processing, distribution, and storage. From the donor data produced in 2020, as many as 183 donors and in 2021, as many as 605 donors.

**Table 2. Acquisition Data**

Convalescent Plasma Type	Convalescent Plasma Type	
	2020	2021
FFP PKC A (blood type A convalescent plasma)	130 kolf	410 kolf
FFP PKC B (blood type A convalescent plasma)	177 kolf	646 kolf
FFP PKC O (blood type A convalescent plasma)	226 kolf	778 kolf
FFP PKC AB (blood type A convalescent plasma)	35 kolf	105 kolf
<b>Total convalescent plasma treatment</b>	<b>568 kolf</b>	<b>1.939 kolf</b>

Source: Data Processed, 2022

In procuring convalescent plasma donors, Trio explained the process from donor selection to donor collection, that to become a convalescent plasma donor there are requirements that must be met, including, the donor must be male, have a minimum age of 17 years, have been exposed to Covid-19 but have never been transfused during the healing period. Not all prospective donors who are selected can carry out convalescent plasma donations, which in the selection process will be examined on blood samples of prospective donors with intensive examinations including hemoglobin examination, complete blood examination including examination free from HIV, HCV, HBS AG, Syphilis, Covid-19 antibody titer examination, IGG IGM titer examination using a tool that has been recommended by the PMI Central UTD and standardized by CPOB. The results of the examination of the blood sample were obtained. Answering the second question, it was stated that convalescent plasma donors do not only come from Lumajang, there are several from other cities, such as Jember, Malang, Situbondo, Bondowoso, and Banyuwangi. For donors from outside the city, we will pick them up and drop them off when they are about to donate.

Furthermore, regarding the success rate of the donor collection process, it was conveyed that not all convalescent plasma donor retrieval was successful. This was due to several things, one of which was the readiness of the donor. Sometimes the donor suddenly felt afraid, nervous, or tense. This greatly affected the collection process. If there is a failure in the retrieval process, the process will be stopped. Plasma that has been released when the volume is less than 100 cc of plasma will not be processed. The bag and plasma will be destroyed or discarded. Ratih explained the processing process from the beginning until the plasma was ready to be sent to the release department. Plasma received from the aftap section will be processed by separating it using a device called a wafer, each bag containing 200cc of separation results. The use of wafers depends on the volume of plasma produced for the results of 400cc-800cc separation using 1 wafer, and for results of 900cc-1000cc using 2 wafers. Then reconnected using TSCD-II to connect the bag hose with a closed system. After the separation process is complete, the plasma will be sent to the release section to be given a release label and then submitted to the storage section. Plasma is stored in a special blood bank.

The quality manager is in charge of directly monitoring and being responsible for the procurement of convalescent plasma to ensure the quality of blood products is maintained, Anis Mufarida explained that as a responsibility to the community in maintaining the quality of convalescent plasma, the production process refers to the standard of good drug manufacturing (CPOB) according to the certificate issued by the POM (BPOM) number 015/CPOB-UTD/XII/2019. Regarding the cost as a substitute for processing, it is determined by the Central Board of the Indonesian Red Cross number 023/KEP/PPMI/III/2021 regarding the stipulation of a replacement fee for the provision of UTD PMI convalescent plasma as the legal basis for withdrawing tariffs to patients. The tariff is set at Rp. 2,250,000 per plasma bag, convalescent.

Information related to the method used in calculating inventory, Muhamad Miqdad Maulana explained in calculating the cost of convalescent plasma supplies at UTD PMI Lumajang Regency, namely by calculating all expenditures for consumables used in the convalescent plasma process, calculations are carried out globally using the average method through the ZAHIR accounting information system. Other indirect costs are not included in the cost of inventory but are recorded separately in the recording of operational costs. From the accounting department, data on expenditures issued in the context of the process of procuring convalescent plasma are obtained. Namely reports on supplies of consumables, convalescent plasma inventories, reports on the use of consumables, financial reports.

From the results of the study, we carried out a discussion with 14 stages in a quasi-qualitative method.

1. Searching for the Problem. Based on the observations of previous researchers, no one has discussed the cost of convalescent plasma supplies. For this reason, the researchers focused this research on determining the cost of convalescent plasma supplies as the cost of supplies for health organizations. By referring to research conducted by Mafirakureva et al., (2016). The supply of convalescent plasma is of particular concern where the price to be paid by the patient is fantastic when compared to the price of other blood products. From the research results obtained through data and interviews with related parties and observations, the data obtained in the process of procuring convalescent plasma, which is carried out in detail and thoroughly, can be analyzed for the costs incurred by each work unit so that the cost for one bag of convalescent plasma is generated. Researchers examined the cost of supplies from the donor side and the use of the type of bag or apheresis kit. By using the amount of plasma taken and the use of different types of bags as samples, one can obtain the calculation of inventory costs.
2. A Literature Review. This study focuses on how to calculate the cost of convalescent plasma supplies in health organizations of non-profit non-governmental entities, especially at PMI Lumajang Blood Transfusion Unit. Anis Mufarida delivered the GMP certificate obtained at the end of 2019, and then UTD PMI Lumajang received permission to produce and provide

convalescent plasma products intended for Covid-19 patients as a therapy to increase antibody immunity in patients. The cost of supplying convalescent plasma certainly cannot be separated from a process that involves, from upstream to downstream, donors; UTD PMI Lumajang as collector; hospitals; and patients. So it takes a concrete, detailed calculation to produce a convalescent plasma supply cost (Khoiri et al., 2021).

3. According to the founding gap, inventory in health organizations is different from inventory in trading, service, and manufacturing businesses. The distinction is whether the inventory in the trading business is purchased in the form of ready-to-sell goods with the intention of reselling them for profit. Raw material inventory, auxiliary material inventory, work-in-process inventory, finished goods inventory, and inventory for inventory service businesses, including service costs, are the four types of inventory in manufacturing. Supplies to health organizations are health services. In this case, convalescent plasma fulfillment services are a form of health service to the community.
4. Constructing Hypotheses. Based on the results of research based on the theory used, namely non-profit non-governmental entities and overall and detailed information (Hoesada, 2021). From the results of the study, it was calculated that the cost of convalescent plasma supplies was lower than those charged to the patient. There were several results indicating that the costs incurred occurred an imbalance where under certain conditions the costs incurred exceeded the costs charged to the patient and vice versa, there were also lower costs than those charged to the patient. The convalescent plasma tariff remains in effect in accordance with the regulations issued by the Central PMI Management, which is Rp. 2,250,000 per 200cc bag. As a non-profit non-governmental entity, UTD PMI Lumajang Regency has carried out its duties in accordance with applicable regulations, that this organization does not prioritize or does not seek profit (Ariyanti & Soraya, 2020). This is shown from the results of the study, when there is a lower cost or a surplus occurs, the excess is used to cover the shortage of higher costs or losses.

**Table 3. Comparison of Central Tariffs with calculation results**

Bag type	Tapping result	Central rate	Calculation result	Difference
Trima Acell	200 cc	Rp. 2.250.000	Rp. 3.045.044	(Rp. 795.044)
	400 cc		Rp. 2.155.160	Rp. 94.840
	800 cc		Rp. 1.086.330	Rp. 1.163.670
	1000 cc		Rp. 1.331.064	Rp. 1.918.936
Multi Plasma	200 cc	Rp. 2.250.000	Rp. 3.045.044	(Rp. 795.044)
	400 cc		Rp. 1.522.522	Rp. 727.478
	800 cc		Rp. 770.011	Rp. 1.479.989
	1000 cc		Rp. 1.078.080	Rp. 1.171.920
Spectra Optia	200 cc	Rp. 2.250.000	Rp. 4.568.017	(Rp. 2.318.017)
	400 cc		Rp. 2.284.008	Rp. 34.008
	800 cc		Rp. 1.150.754	Rp. 1.099.246
	1000 cc		Rp. 1.382.603	Rp. 867.397

Source: Data Processed, 2022

The table above illustrates that there is a deficit or loss in the production of convalescent plasma, especially in the production of 200cc. By using a cell trim bag, the resulting cost is Rp. 3,045,044; a multi plasma bag, Rp. 3,045,044; and a spectra optia bag, the resulting cost is Rp. 2,284,0008, but when the plasma is used by patients who need it, the tariff applied is fixed at Rp. 2,250,000. Obviously, there are losses to be borne. However, in the production of 400cc, 800cc, and 1000cc, the average surplus, so that this surplus can be used to cover the borne deficit. As well as ensuring product safety and quality by presenting detailed donor data and the detailed examination process, so that both donors and patients using convalescent plasma feel comfortable and at ease.

Data source for planning, to explore the problems studied, namely regarding the cost of convalescent plasma supply, the researcher collected data from several units related to the convalescent plasma supply process. Donor data from 2020 and 2021, as well as data on consumable use from all related units, were used. The results of the collection from convalescent plasma donors in 2020 were 183 donors, with the details of the results for each blood type A as much as 43 kolf, B as 58 kolf, O as 71 kolf, and AB as much as 11 kolf. Meanwhile, in 2021 there will be 605 donors with details of the results for each blood type: A as much as 112 kolf, B as much as 226 kolf, O as much as 250 kolf, and AB as much as 17 kolf.

**Table 4. Calculation Using Trima Acell Double Bag**

No.	Tapping Result (cc)	Processing Result	Type of Cost	Cost Value
1	200	1 kolf @ 200cc	Selection	884.628
			Tapping	3.190.691
			processing	35.000
			labor, utility	200.000
			Total cost	4.310.319
			Kos per bag	4.310.319
2	400	2 kolf @200cc	Selection	884.628
			Tapping	3.190.691
			processing	35.000
			labor, utility	200.000
			Total cost	4.310.319
			Kos per bag	2.155.160
3	800	4kolf @200cc	Selection	884.628
			Tapping	3.190.691
			processing	70.000
			labor, utility	200.000
			Total cost	4.345.319
			Kos per bag	1.086.330
4	1000	4kolf @200cc	Selection	884.628
			Tapping	5.500.691
			processing	70.000
			labor, utility	200.000
			Total cost	6.655.319
			Kos per bag	1.331.064

Source: Data Processed, 2022

**Table 5. Calculation Using Multi Plasma Bags**

No.	Tapping Result (cc)	Processing Result	Type of Cost	Cost Value
1	200	1 kolf @ 200cc	Selection	884.628
			Tapping	1.925.416
			processing	35.000
			labor, utility	200.000
			Total cost	3.045.044
			Kos per bag	3.045.044
			Kos per kantong	
2	400	2 kolf @200cc	Selection	884.628
			Tapping	1.925.416

			processing	35.000
			labor, utility	200.000
			Total cost	3.045.044
			Kos per bag	1.522.522
3	800	4kolf @200cc	Selection	884.628
			Tapping	1.925.416
			processing	70.000
			labor, utility	200.000
			Total cost	3.080.044
			Kos per bag	770.011
4	1000	5kolf @200cc	Selection	884.628
			Tapping	4.235.416
			processing	70.000
			labor, utility	200.000
			Total cost	5.390.044
			Kos per bag	1.078.008

Source: Data Processed, 2022

**Table 6. Calculations Using Spectra Optia Kantong Bags**

No.	Tapping Result (cc)	Processing Result	Type of Cost	Cost Value
1	200	1 kolf @ 200cc	Selection	884.628
			Tapping	3.448.389
			processing	35.000
			labor, utility	200.000
			Total cost	4.568.017
			Kos per bag	4.568.017
2	400	2 kolf @200cc	Selection	884.628
			Tapping	3.448.389
			processing	35.000
			labor, utility	200.000
			Total cost	4.568.017
			Kos per bag	2.284.008
3	800	4kolf @200cc	Selection	884.628
			Tapping	3.448.389
			processing	70.000
			labor, utility	200.000
			Total cost	4.603.017
			Kos per bag	1.150.754
4	1000	5kolf @200cc	Selection	884.628
			Tapping	5.758.389
			processing	70.000
			labor, utility	200.000
			Total cost	6.913.017
			Kos per bag	1.382.603

Source: Data Processed, 2022

From the study of the convalescent plasma inventory cost above, it can be seen that the inventory cost is influenced by several factors, including donor factors and consumables used. Each plasma

donor produced is different. This will affect the cost of convalescent plasma supplies in each bag.

The cost of convalescent plasma supply using the Trima Acell bag in terms of the results of donor collection.

- a. 200cc of Rp. 3.045.044
- b. 400cc of Rp. 2.155.160
- c. 800cc of Rp.1.086.330
- d. 1.000cc of Rp.1.331.064

The cost of convalescent plasma supply with the use of Multi Plasma bags in terms of donor collection results.

- a. 200cc of Rp.3.045.044
- b. 400cc of Rp.1.522.522
- c. 800cc of Rp.770.011
- d. 1.000cc of Rp.1.078.080

The cost of convalescent plasma supply with the use of Spectra Optia bags in terms of the results of donor collection

- a. 200cc of Rp.4.568.017
- b. 400cc of Rp.2.284.008
- c. 800cc of Rp.1.150.754
- d. 1000cc of Rp. 1.382.603

5. Constructing data collection methods strengthens the results of research conducted through interviews. From the results of interviews with quality managers, Anis Mufarida said that the process to produce convalescent plasma supplies had been carried out based on applicable standards and in accordance with GMP. This is stated in the Standard Working Procedures owned by UTD PMI Lumajang Regency. as well as reports on the outcomes of work in each unit. The donor procurement department conducts a search for donors in collaboration with hospital agencies, government agencies, and the private sector. This has been realized by donors by several officials, such as the Regent of Lumajang, namely Mr. Thoriqul Haq (Kominfo, 2021). The prospective donors have been carefully selected according to standards so that safe and quality convalescent plasma products are produced. So that the patient gets a new life, namely recovering from Covid-19 (Maulana, 2020). The processing section performs processing in accordance with the applicable standards for the separation of the extraction results using SC wafers for separation, with standardized provisions, namely for the use of wafers with separation results of 400 cc–800 cc using 1 wafer and separation results of 900 cc–1000 cc using 2 wafers.
6. Using a theoretical framework, the data from the research results obtained are data generated from the Blood Donor Information System, or SIMDONDAR, and from a financial information system called the ZAHIR, as conveyed by the finance department, namely Muhammad Miqdad Maulana. Data is generated by the two systems and used by researchers to complete their research. The data generated from SIMDONDAR is related to donor data, especially convalescent plasma donors. Meanwhile, from SIM Zahir is data related to the use of consumables and the financial reports of UTD PMI Lumajang. The research findings show that the convalescent plasma supply process is standard and can be traced in great detail, and the research findings show that the costs incurred are different due to uncontrollable natural factors, resulting in a diversity of inventory costs incurred.
7. Data collection. Researchers used data triangulation by direct observation of the procurement process for convalescent plasma supplies. Based on the data from the report produced, the researcher conducted in-depth interviews for the related sections. From the results of the



interview, it is shown that the reports submitted by the participants indicate that the process of procuring convalescent plasma is in accordance with applicable standards. Judging from the costs incurred, there is a difference due to unpredictable natural conditions. So this causes the uncertainty of the inventory cost incurred in each convalescent plasma bag.

8. Keep a diary and transcript, code, themes, categorization, and memos.  
From the results of data collection, the transcripts include donor data and data on the use of consumables used in the donor selection, collection, and processing sections supported by interviews by each department. The data shows in detail the donor's data from the name, address, weight, medical history, examination results, and time of collection, as well as the volume of plasma that was successfully taken with the use of consumables, which were recorded in detail the amount and value. Trio submitting donor data will be explored in depth when prospective donors carry out donor selection.
9. Trying to find newsources of informationn, the results of the interviews showed that the data obtained were true. Interviews were conducted with relevant sections of donor procurement, processing, finance and quality management. Interviews show uniformity and mutually support the truth of the data.
10. Triangulasi  
Data triangulation uses data generated from the system, namely SIMDONDAR and ZAHIR, namely donor data and financial data. These two data points are combined to produce a detailed calculation of the cost of convalescent plasma supplies, both from the number of donors and the consumables used. From this data, it shows that the cost of supplies depends on the condition of the donor and the use of consumables in this case, especially the selection of bags or apheresis kits. With the use of certain branded bags, higher costs are generated. In addition, the results also affect the costs incurred.
11. Constructing Theory  
From the results of the research conducted, the researchers found a new theory about inventory costs in health accounting. Inventory in health accounting is about health services. The products produced by health organizations are in the form of health services aimed at the community to support the government in implementing programs to ensure public health (Bastian, 2019).
12. Confirmation theory as a non-profit organization, the calculation of the cost of convalescent plasma supplies produced by research shows that the cost has the potential to cause losses, although, on the other hand, under certain conditions, there are advantages that can be obtained. The Indonesian Red Cross Blood Transfusion Unit, Lumajang Regency, has carried out its role well. This is illustrated when there is an excess of inventory costs that will be compensated for by lower costs. So that in its activities it reflects not looking for profit is really carried out. If the resulting cost is too high, it is still given to the patient at the same replacement cost according to the applicable cost. The cost of inventories produced is too low; the excess is used to cover the shortage of costs that are too high. Judging from the overall information theory and proven details, the process of procuring convalescent plasma that is carried out based on BPOM standards is able to provide comfort to donors as well as patients because their safety and quality are guaranteed (Hoesada, 2021).
13. Constructing a new theory the results of research using several stages above show that the cost of supplies in health care organizations is different from that of trading, services, and manufacturing. Whatever product is produced in a healthcare organization is a health service. Like the convalescent plasma product produced by UTD PMI, Lumajang Regency is in the form of health services aimed at ensuring the health of the Lumajang community in particular and the people in Indonesia in general (Bastian, 2019).

## CONCLUSION

From the results of the research, the researcher concludes that the calculation of the research results is compared with the provisions set by the Central Board of the Indonesian Red Cross number 023/KEP/PPMI/III/2021 regarding the replacement fee for the provision of UTD PMI Convalescent Plasma, which is set at Rp. 2,250,000 per bag. There is a difference. This is due to the difference in price between the type of bag used and the results of plasma collection for each donor. From the data for 2020 and 2021, the average intake of convalescent plasma is between 400cc and 800cc, when viewed from the results of calculations carried out by board researchers issued by UTD PMI Lumajang tends to experience a minus due to the uncertain condition of the donor. The application of a non-profit organization to help each other, the costs generated are too low. The excess is used to cover the shortcomings of the costs that are too high.

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