

Availability of Essential Medicines and Inventory Management Practice at Public Health Centers in Bahirdar Town West Gojjam Zone, Amhara Region, Ethiopia, 2020.

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Abstract

Background

Essential medicines are medicines that satisfy the priority health care needs of the population. These medicines are selected with due regard to disease prevalence and public health relevance, evidence of clinical efficacy and safety, and comparative costs and cost-effectiveness. Essential medicines are intended to be available within the context of functioning health systems at all times in adequate amounts, in the appropriate dosage forms, with assured quality, and at a price the individual and the community can afford.

Objective

To assess availability of essential medicine and inventory management practice at public health centers in Bahir Dar town.

Method:

Institutional based cross sectional study design conduct among six HCs in Bahir Dar town. Checklists were used according to Ems lists from the Amhara region health bureau to assess the availability of essential medicine. IMAT was used to review the essential drugs inventory records of tracer drugs and examine stock records and historical stock outs. An observational method was applied on physical stock of the inventory and the inventory record at the day of visit to check for stock availability, inventory accuracy, stock out durations and stock record variation.

Results

According to the study the average percent of time out of stock was 26.2%; the average percent of essential drugs available on the day of assessment was 74.7%. The average percentage of stock keeping records were accurate (56.7%), this study found that records were greater than physical counts (22.7%) and the average ratio of inventory variation to total stock was 33.7%.

Discussion and recommendation:

The availability of Ems in Bahirdar public health centers was poor. Inaccurate stock keeping record was observed irrespective of health centers level. For increasing inventory management: timely entries to logistic tool, updated records, updated stock status and when drugs are issued from the health facilities store room to different units, the date of issue and quantity issued being recorded on the available logistics tool were necessary.

Introduction

Essential medicines are medicines that satisfy the priority health care needs of the population (1). These medicines are selected with due regard to disease prevalence and public health relevance, evidence of clinical efficacy and safety, and comparative costs and based on cost-effectiveness (2).

Essential medicines are intended to be available within the context of functioning health systems at all times in adequate amounts, in the appropriate dosage forms, with assured quality, and at a price the individual and the community can afford. About One third of world population doesn't get access for essential medicines and majority almost half of the population in Africa and Asia doesn't get access for essential medicine (3). Based on the recommendations of WHO Ems should be available 100% (4). However, in Ethiopia it was found to be 91%. Researches emerged after 2009 implies that the availability of essential medicines in the country was varies from 26-91% (5). Shortages of availability of essential medicines leads to divert people to private facilities which are high in costs and that may leads to therapeutic failure with majority of patients with low income and have to depend on the subsidized cost of healthcare promised in public facilities. (4).

Pharmaceutical supply systems in many developing countries have severe problems on inventory management practice, including ineffective procedures in selection, poor quality control, and economically inefficient procurement. This has been documented in numerous reports and publications. For good pharmaceutical logistics system such as (selection, quantification, procurement and distribution) essential medicines are the major components, but if the logistic system doesn't include good practice of Ems lead to failure of whole pharmaceutical management process (5, 6).

For ensuring availability of Ems, good inventory management practice was needed. Inventory management was a good stock keeping practice that has accurate record keeping practice.(7) Accurate and updated stock records helps for calculating future needs, and holding stocks was important to ensure availability of essential items almost all the time(8) .

Ethiopian Pharmaceutical Supply Agency (EPSA) undergoes researches on the assessment of inventory management practice in Ethiopia. Which indicates ware-house adequacy related challenges, demand information related problems and capacity building related challenges are the issue for poor inventory management process in Ethiopia. Poor inventory management in public health institutions results wastage of financial resources, poor availability of essential medicines, stock outs, and consequently, failure to improve patients' health outcomes (9).

The low availability of essential medicines and inventory management performance was the most problems of public sectors. Due to such reasons stock out can be occurred or happened in most of the time which was the main challenges for: the patients to get/take the medicines at the time they need and tends them in to other health problems either therapeutic failure, patient forced to purchase or bought

drugs from the private pharmacies, patient loss their time and energy and also go to informal center or forgo treatment, and resistance or held them for death. There for this study aimed to assess the problem of essential drugs inventory management practice at public health centers found in Bahir Dar town, Amhara region. To provide a good insight for the current tracer drugs inventory management practice and drugs availability at health centers and to provide information about track changes and improvements in drugs availability and pharmaceutical inventory management practice over time.

Operational Definitions

- **Essential medicines:** are defined as “medicines that satisfy the priority health care needs of the population,” or it can be defined as medicines that needs to be available in all times, with adequate amount, standard dosage forms and with fair coast in all health facility. (1)
- **Tracer drugs:** drugs listed by ministry of health of a country that should be available in all days and nights of the year.(10)
- **Inventory Management:** management system that involves ordering, receiving, storing, issuing and recording limited items based on the policy listed by the responsible body/ ministry of health.(11)
- **Availability of Medicines:** Available in the health facility during the time of visit.(4)
- **Stock out:** The imbalance of the demand and the current inventory. Or it was unavailability of usable stocks in the store or a balance of zero on the bin cards at store.(12)

Methods And Materials

study area and study period

A cross sectional study was conducted from May 11, 2020 to May 18 2020, in Bahir Dar city. Bahirdar was the capital city of Amhara regional state, situated 578Km from Addis Ababa (capital city of Ethiopia). The town was administratively structured by 06 sub cities and 17 KEBELES and has a total population of 356,757 of whom 168,839 are males and 187,918 females. The town has three government hospitals, 06 health centers, and six private Hospitals.

Study design

A descriptive cross-sectional study complemented with a quantitative method was conducted.

Source of data

Helath centers found in Bahiradr city were the source population.

Data collection instrument and procedure

According to unpublished data of Amhara regional health bureau 25 drugs were identified as Essential medicines. Checklists were used according to Ems lists from the region to assess the availability of essential medicine. Inventory Management Assessment Tool (IMAT) was used to review the essential drugs inventory records of tracer drugs and examine stock records and historical stock outs. An observational method was applied on physical stock of the inventory and the inventory record at the day of visit to check for stock availability, inventory accuracy, stock out durations and stock record variation. For data collection procedure the following issues were addressed: Accuracy of stock record was collected by reviewing of store bin card and comparing it with the physical counts on the day of vwasit. Ratio of inventory variation to total stock was collected by reviewing the available stock level of products in the store and comparing it with difference on the recorded stock level of the product. Data on product availability was collected based on quantity of items on the store at the day of vwasit Data on days out of stock was collected by quantifying number of days of each items was out of stock within the assessment period (the last 100 days).

Data analysis

A data collected by using forms and checklists were entered in to excel for further analysis of Essential medicine availability and to determine inventory management practice of health centers found in Bahirdar city. Stock out of tracer drugs was assessed based on average percentage of time that products were out of stock for the past 100 days and percentage of availability of products in stock was based on the stock available on the day of the assessment.

The following measurements that used for analysis of inventory management were adopted from (13).

Percentage of products in stock: It Measures the system's effectiveness in maintaining a range of products in stock (at the time of the assessment) calculated by.

$$\frac{\text{The total products in stock}}{\text{Total number of products in the study}} \times 100$$

Then, the average percentage of products available on the day of visit for the facility sample was obtained as follows:

$$\frac{\text{Sum of \% of products in stock on the day of assessment for each facility}}{\text{Total number of facilities in the sample}} \times 100$$

Average percentage of time that products are out of stock: It Indicates the system's capacity to maintain a constant supply of products over time by minimizing the duration of stock outs. It was assessed based

on average percentage of time that products were out of stock for the past 100 days.

$$\frac{\text{Total number of days out of stock within the last 100 days}}{\text{Total number of products in the study} \times 100 \text{days}} \times 100$$

Total number of products in the study x 100days
then after, the average percent of time out of stock of the tracer products for the facility sample was obtained using the following formula:

$$\frac{\text{Sum of average \% of time that products were out of stock for each facility}}{\text{Total number of facilities in the sample}} \times 100$$

Total number of facilities in the sample

Percentage of stock records that was accurate: It Indicates the quality of the record-keeping system by identifying the proportion of records that was accurate. The first step was to obtain facility specific percentage of stock records of tracer drugs that was accurate corresponding with physical counts was obtained, using the following formulas:

$$\frac{\text{Count of records that are accurate}}{\text{Total number of products in the study}} \times 100$$

Total number of products in the study

Thereafter, the average percent of stock records that was accurate for the tracer products for the facility sample was obtained using the following formula:

$$\frac{\text{Sum of average \% for each facility}}{\text{Total number of facilities in the sample}} \times 100$$

Total number of facilities in the sample

Ratio of inventory variation to total stock: It indicates the severity of record-keeping errors. First, facility specific ratio of inventory variation to total stock was obtained as follows:

$$\frac{\text{Total sum of Absolute value of the difference between recorded and physical values}}{\text{The total sum of Physical quantity (based on actual count)}} \times 100$$

The total sum of Physical quantity (based on actual count)

Then, the average ratio of inventory variation to total stock for the facility sample was obtained as follows;

$$\frac{\text{Sum of average ratio of inventory variation for each facility}}{\text{Total number of facilities in the sample}} \times 100$$

Total number of facilities in the sample

Data quality assurance

In order to check for data collection tool completeness, accuracy, Clarity and consistency pre-test was done in Zenzelma health center. Trainings for two days were obtained for data collectors which were 3rd year pharmacy students.

Ethical consideration

Ethical approval was obtained from the Ethics & research Committee of GAMBY medical and business College. The aim of the study and the way it was going to be conducted was explained to the head of pharmacy unit and pharmacists of each health centers.

Dissemination of the result

At the end of the study, Findings of the study was communicated to stock holders, and will be presented on scientific meetings and conferences as well it will submit for publication on scientific journals.

Results

Availability of tracer drugs:

In ideal situation we expect 100 % of tracer drugs to be available in all health centers at all time (3). However, availability of essential medicines among health centers in Bahirdar was found to be 74.7%. The highest percentage of tracer drugs availability was observed in Bahir Dar health center which was 84%. **(Fig-1)**

The average percentage of time that tracer drugs that are out of stock:

In ideal situation, stock out rate was expected to be 0% within all vwasited time. The average stock out rate of EMs in Bahirdar city health centers was 26.2%. From the result: Shumabo health center have the highest stock out rate which was 34% and Dagmawi Minilik health center had the lowest stock out rate (14%). **(Fig 2)**

Accurate stock records:

According to the result the average percentage of accurate stock record keeping practice was 56.7%. Dagmawi Minilik health center had a clear accurate recording of stocks than other health facilities (100%). On the other hand Bahir Dar, Abay and Han health centers had poor record keeping practice (32%, 44% and 48% respectively) **(Fig 3)**

Percentage of stock records that was greater than physical count:

The percentage of stock records that was greater than the physical count was 22.7%, which was far from the ideal record system (0%). Abay health center and Han health center had 24% and 48% (respectively) of stock records that was greater than the physical count. However, Dagmawi Minilik had performed ideal record system of the lowest value which was 0%. **(Fig 4)**

Percentage of stock keeping records that was less than physical count of the stock:

The percentage of stock keeping records that was less than the physical count of the stock had an average of 18%. This was interpreted as 18% of records were less than where available in shelves. Even though, the ideal value for this indicator was 0%. In Bahir Dar health center percentage of stock keeping records that was less than the physical count of the stock was 40% which was highest than other health centers and Dagmawi Minilik health center had 0 % records available in the shelves.**(Fig 5)**

Inventory variation to total stock:

According to this study the average ratio of inventory variation to total stock was 33.7%. Among health centers Abay health center had the highest score which was 121% and Dagmawi Minilik health center had the lowest value which was 0%. **(Fig 6)**

Discussion

In Ethiopia, there are frequent drug shortages in public health facilities; a national survey estimates that only 70% of essential medicines were available in the public sector (14). Similarly in this research the availability of essential medicines were on average of 74.7 % during the day of visit.

This finding was higher when compared with a study conducted in health centers of south Western Ethiopia showed that only 55.6% of essential drugs were available (15). This might be due to budget utilization of health facilities, quality of PFSA, and due to the data collection procedures because this study uses WHO checklist technique.

However the result was lower when compared to Ghana, Tanzania and Kenya the availability of Essential Drugs was 80%, 88.9% and 82.6%, respectively (16, 17, and 11). This may be as a result of PFSA quality of each country, demographic variations, economic status difference between each country, and might be due to budget utilization of each country across the continent.

Stoke out days

This study found that all facilities had experienced stock out of a number of products in the past 100 days and all had stock outs of a number of products on the day of assessment.

Stock outing of EMs at the day of surveys in Bahir Dar city health centers was 26.2% which was higher than previous studies in Tanzania 20%, south wollo zone 14% and Gondar Ethiopia 9% and (17, 18, and

19). This might be due to good stock record technique, and awareness of which drugs are essential in the community.

Stoke record accuracy

Accuracy of stock records was very critical for proper inventory management. According to the study 56.7% of the records were accurate records. As the data indicates on average of 43.3% of stock records were inappropriate. This might be due to lack of knowledge about appropriate stock record practice or it might be due to lack of trainings on how to perform accurate stock records. This finding was lower when compared with a study done in south wollo which was 62%. This could be as a result of accurate consumption data are not available, and poor knowledge of stoke keeper.

The recorded balances that were greater than the physical counts were 22.7%. Which indicates the recording of supplies in Bahirdar health centers was very poor. Recorded balances that were less than the physical counts were 20.7%; this means that receipts were not correctly recorded. The average percentage of total variation between stock records and physical counts for the tracer products was 43.4%, which was relatively higher compared to a study done in south wollo which was 39% (19). The difference might be due to knowledge of stock keepers, lack of software applications and budget sufficient of health centers.

Ratio of inventory variations

According to This study the ratio of inventory variation was 33.7%. This was significantly higher when compared to ratio of international variation which was 21%. The study done in Afghanistan found that 20% to 25% of the warehouses did not have up to date stock cards, did not mark dates of stock outs and did not keep the stock card with the items (20). This difference might be due to recording status of the facility, and it might be also due to the variation on assessment of the progress.

Conclusion

Availability of essential medicine in Bahirdar city health centers was inadequate. Inaccurate record keeping practice was high in all health facility despite of the facility level/facility volume. The practice of updating record in the logic system tool was also the problem. In addition, Ratio of inventory variation to total stock was higher.

Recommendations

Frequent checkup of stock status should be made by responsible bodies, and numbers of professionals who works at pharmacy should be increased to reduce workload and to practice accurate and updated record keeping practice were advisable to have good inventory practice and availability of essential medicines. Logistic tools should update stock status and when drugs are issued from the health facilities

store room to different units, the date of issue and quantity issued have to be recorded on the available logistics tools. The government should monitor the record keeping practice.

Limitations Of The Study

- The data collection does not include its special zone health centers
- In health centers like Bahirdar health center computers were not functional and improper use of bin card was observed

Declarations

Consent for publication

Not applicable

Competing Interests

The Authors declare that there was no competing interest.

Funding

No Funding was obtained for this study

Authors' Contributions

DSM, KWM, and TA, had involved in the proposal preparation and design, data collection, statistical analyses and interpretation, and manuscript preparation. All authors have equal contribution to this research.

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Abbreviations

IMAT -Inventory Management Assessment Tool, LMIS-Logistics Management and Information System, PFSA - Pharmaceutical Fund and Supply Agency, RRF- Report and Requisition Form, STI- Sexual Transmitted Infection , TDs-Tracer Drugs, WHO-World health organization

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Figures

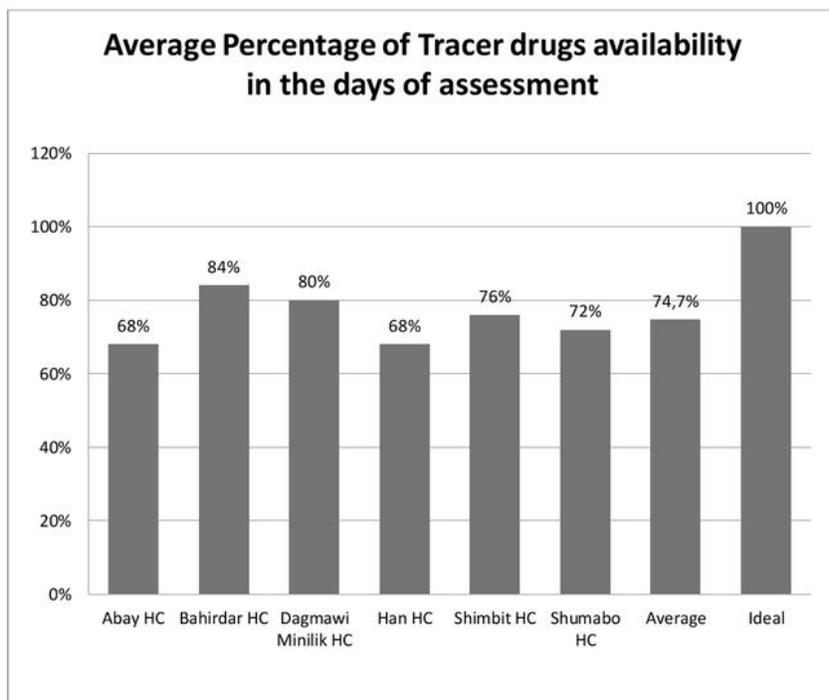


Fig 1: Average percentage of tracer drugs availability in the days of assessment in each health centers: Bahirdar, Ethiopia, 2020GC.

Figure 1

average percentage of tracer drugs availability into the days of assessment

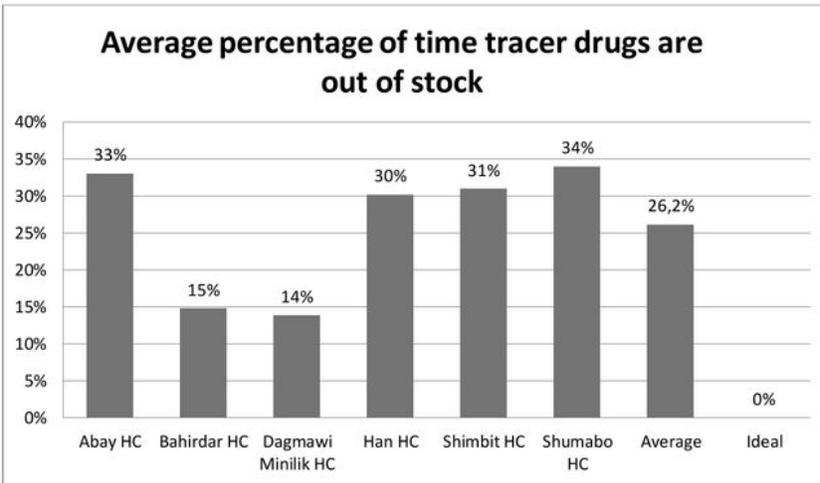


Fig 2: Average percentage of time tracer drugs which are out of stock in each health centers: Bahirdar, Ethiopia, 2020GC

Figure 2

average percentage of tracer drugs that are out of stock

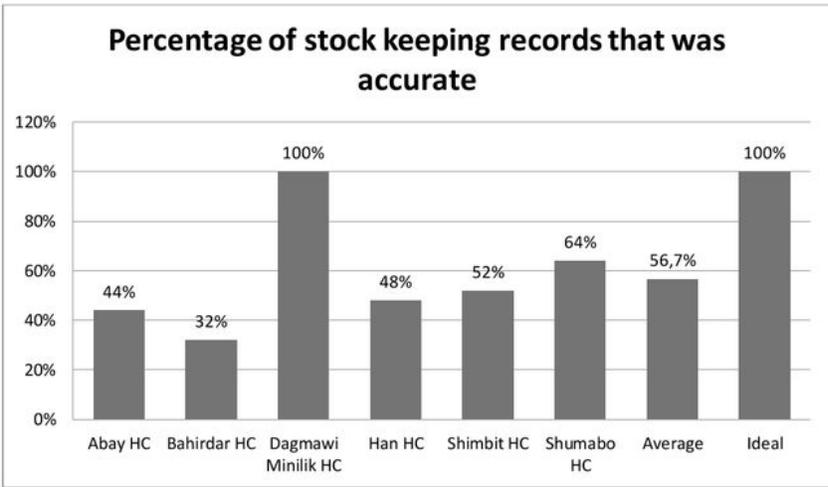


Fig 3: percentage of stock keeping records that was accurate in each health centers: Bahirdar, Ethiopia, 2020G.C

Figure 3

percentage of stock keeping records that was accurate

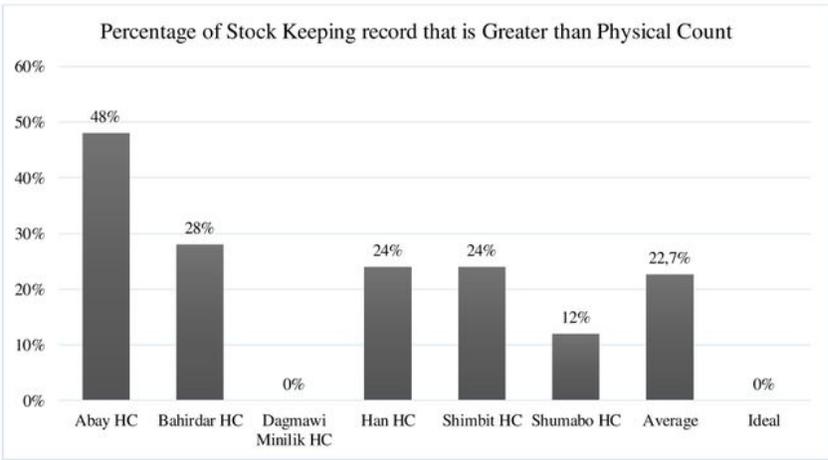


Fig 4: percentage of stock keeping record that was greater than physical count: Bahirdar, Ethiopia, 2020GC

Figure 4

percentage of stock keeping record that are greater than the physical count

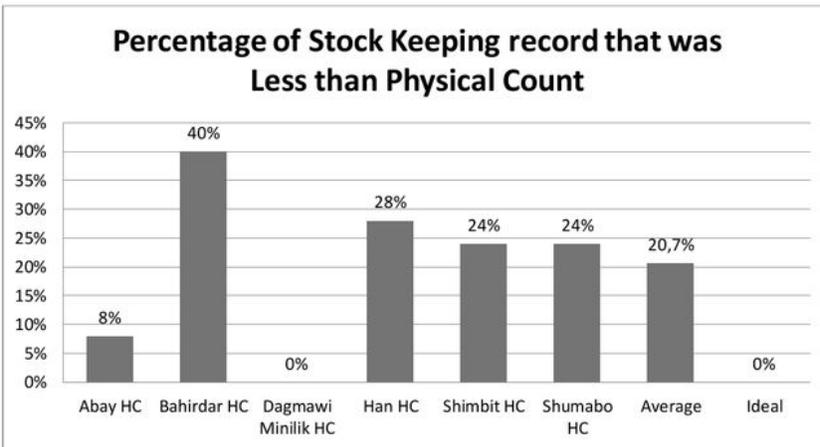


Fig 5: percentage of stock keeping record that was less than physical count: Bahirdar, Ethiopia, 2020G.C

Figure 5

percentage of stock keeping record that are lesser than the physical count

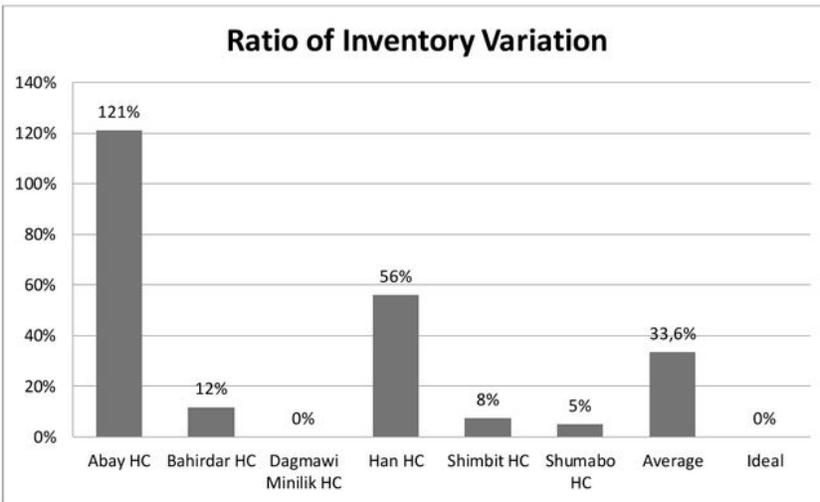


Fig 6: Ratio of inventory variation in each health centers: Bahirdar, Ethiopia 2020G.c

Figure 6

Ratio of inventory variation

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