# Treatment seeking delay and associated factors in adult heart failure patients admitted to Debre Tabor comprehensive specialized hospital, North West, Ethiopia

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## ARTICLE INFO

## ABSTRACT

*Objectives:* This study was aimed at assessing the magnitude of treatment-seeking delay in adult heart failure patients and identifying factors that contribute to it.

*Design:* An institution-based cross-sectional study with a consecutive sampling technique was conducted at Debre Tabor Comprehensive Specialized Hospital from February 1 to November 1, 2021.

*Setting:* The study was conducted in the medical ward of the hospital.

*Participants:* A total of 187 patients aged 18 and above admitted with a diagnosis of heart failure, and able to provide information were included.

*Results:* The median delay time of adult heart failure patients admitted to the hospital was 15 days. The mean length of delay was also calculated to be 25.02 days. Urban residents and those who live at a ten or less-kilometer distance from healthcare facilities were found to be less likely to delay seeking care. Presenting with shortness of breath or paroxysmal nocturnal dyspnea, perceiving the cause to be heart-related, and getting positive responses from significant others were also associated with a relatively short delay time.

*Conclusion:* Treatment-seeking delay was found to be a major problematic issue in heart failure patients. Therefore, patients, patient families, and the community at large must be taught about the symptoms of heart failure and the need for timely care.

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## 1. Introduction

Heart failure is a global public health problem estimated to affect 64.3 million people worldwide [1]. It is one of the major medical conditions associated with a high rate of hospitalization, functional disability, and death [2–4]. A systematic review and meta-analysis on the survival of chronic heart failure patients reported 1-, 2-, 5-, and 10-year survival rates of 86.5 %, 72.6 %, 56.7 %, and 34.9 %, respectively [5]. The incidence of heart failure is high in the elderly population. Older age is also a major predictor of mortality in heart failure patients [6,7].

Dyspnea on exertion or at rest, fatigue, body swelling, cough, and orthopnea are the commonest symptoms perceived by patients with heart failure. Individuals who are suffering from symptoms of heart failure often delay seeking medical care for hours to months [8,9]. Many patients visit acute care settings months after the perception of heart failure symptoms [10]. This delay time is the amount of time between symptom onset to arrival at a healthcare institution [11].

A number of factors can affect the treatment-seeking behavior of patients with symptoms of heart failure. Advanced age, illiteracy, and living in rural areas are found to be associated with prolonged delay times [9,11,12]. The first symptom of heart failure perceived by patients also contributes to delay. For instance, patients spend more time at home with fatigue than with other symptoms of heart failure [8].

Lack of awareness about heart failure and failure to recognize its symptoms or improper interpretation of symptoms are among the factors that prolong delay time. Nearly two-third of patients with heart failure are unable to recognize the symptoms they perceive to be heart-related. In a study conducted in the northeastern United States to examine the factors contributing to delayed care-seeking for acute decompensated heart failure, it was found that a mere 37 % of individuals were able to correctly identify that their symptoms were associated with heart failure [11]. Some patients relate the symptoms to respiratory problems, others to aging and fatigue. Inappropriate responses to symptoms of heart failure, like waiting to see if symptoms go away or avoiding thinking of the symptoms, can also increase the delay time. Additionally, passive responses of family members, colleagues or others to the symptoms of the patient have negative effect on timely care [9,11,12].

Prolonged delays in seeking health care for heart failure symptoms are associated with worse outcomes and longer hospital stays [13]. Despite the high burden of cardiovascular diseases in Ethiopia, there is a lack of data on treatment-seeking delays for cardiac symptoms [14]. This study was therefore aimed at assessing the magnitude of treatment seeking delay in adult heart failure patients, and identifying factors that contribute to it.

## 2. Methods

### 2.1. Study design and setting

An institution-based-cross sectional study was conducted at Debre Tabor Comprehensive Specialized Hospital (DTCSH) from February 01 to November 01, 2021. The hospital is the only comprehensive specialized hospital in south Gondar zone of Ethiopia, located 667 kms from Addis Ababa in the north central part of the country.

### 2.2. Eligibility criteria

All patients aged 18 and above admitted with a diagnosis of heart failure confirmed by an internist (no cardiologist in the hospital) were included. The diagnosis may be made clinically, which is most commonly based on Framingham criteria, or with diagnostic studies available in the hospital like ECG, echocardiography, and chest X-ray. Those who were unable to provide information due to sever psychiatric illness or terminal medical illness throughout their hospital stay were excluded from the study.

### 2.3. Sample size determination and sampling technique

All eligible patients admitted to medical ward of the hospital during the data collection period were included. This was done because of small number of heart failure patients getting admitted to the hospital.

### 2.4. Data collection instrument and procedure

Data was collected using interviewer-administered questionnaire and chart review. The tool was adapted from published papers related to the topic, and modifications were made to ensure the instrument's appropriateness for the research objectives [8,11,12]. Additionally, rigorous translation process was done. It was first adapted in English, then translated into Amharic, and finally translated back to English to check for consistency.

Data was collected by nursing instructors providing community service in the ward. Patients were contacted after reviewing their charts and confirming that they had heart failure. Charts were also reviewed to obtain data on the New York Heart Association (NYHA) functional class of heart failure, length of hospital stay, and treatment outcome.

### 2.5. Study variables

Sociodemographic characteristics, presenting symptoms, patient and significant others responses to the symptoms, length of stay,

and treatment outcome were the independent variables of the study. Treatment seeking delay was the outcome variable of the study.

*2.6. Data processing and analysis*

The data were analyzed using R software version 4.0.3. Descriptive statistics, such as percentages, and frequency tables, were used to describe the study variables. This study also utilized chi-square test to determine the relation between treatment-seeking delay with hospital stay and treatment outcome.

For a binary response $Y_i$ and a quantitative explanatory variable $X_{ij}$, $j = 1, 2 \ldots M$ and $i = 1, 2 \ldots N$, let $\pi_i = P(X_{ij})$ denote the "success probability" when $X_{ij}$ takes the values $X_{ij}$. The problem with the linear model is that the probability model $E(Y)$ used to approximate a probability value $\pi i = P(Y_i = 1)$ within the interval 0 and 1, while $E(Y_i)$ is not constrained. Therefore, we applied the logit transformation, where the transformed quantity lies in the interval from minus infinity, to positive infinity and it is modeled as:

$$\text{The logit } (\pi_i) = \log\left(\frac{\pi i}{1 - \pi i}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots, + \beta_P X_P$$

Here, $\beta_i$ = the coefficient of the ith predictor variable determines the rate of increase or decrease of $X_{ij}$ on the log of the odds that $Y_i = 1$, controlling for the other X.

For binary logistic regression modeling, we used different linkage functions, including legit, probit, and complementary log-log functions, to fit the data, which are described as follows (Table 1).

*2.7. Operational definitions*

Favorable treatment outcome: A desirable result that is achieved as a result of an intervention. Patients with an 'improved' discharge condition were considered to have favorable treatment outcome [15,16].

Treatment seeking delay: The time interval between perception of symptoms and the initiation of professional help was measured as the delay time by subtracting the date of professional treatment seeking contact from the date of symptom recognition. The outcome variable is not normally distributed. Therefore, median delay time was used to categorize treatment seeking delay.

Unfavorable treatment outcome: undesired treatment outcome or lack of significant improvement. It includes discharge conditions such as the same, worsened and referred cases, as well as absconded, death, and left against medical advice [15,16].

**Ethics approval and consent to participate:** Ethical approval with reference number dtu842/2021 was taken from Debre Tabor University College of Health Sciences Permission to conduct the study was also obtained from the hospital. Lastly, participants were provided with information about the study and gave their verbal consent to participate.

## 3. Results

*3.1. Socio-demographic characteristics of patients*

A total of 187 patients were included in the study. The mean age of participants was 52.2 years. About 57.8 % of the participants were female, 69.0 % live in rural areas, 62.0 % didn't attend formal education, and 64.7 % were farmers by occupation. (Table 2)

*3.2. Presenting symptoms and responses to the symptoms*

Fatigue was the commonest presenting symptom reported by 83.4 % of the participants, followed by shortness of breath, which was reported by 78.1 % of the respondents. Body swelling, orthopnea, cough, paroxysmal nocturnal dyspnea (PND) and chest pain were also manifested in 59.4 %, 53.5 %, 46.0 %, 31.6 %, and 19.3 % of the respondents respectively.

About half (51.3 %) of patients thought that the cause of their symptoms was a heart condition. Others associated their presenting symptoms with respiratory problem (24.1 %), other diseases (8.6 %), and aging (6.4 %). Seventy-four (39.6 %) of the respondents perceived their symptoms to be very serious, while 28.3 % perceived the symptoms to be not at all to mildly serious. Seeking heath care was taken as a primary measure to the symptoms in only 28.9 % of the respondents, while others perceived nothing was wrong, went to religious places and traditional healers.

Less than half (44.9 %) of the participants were suggested to seek health care by family members and significant others, while 24.1 % were suggested to use traditional medicines and other treatment alternatives. Significant others response was very helpful to decide

**Table 1**
Link function for the logistic regression model.

| Function | Form | Typical application |
|---|---|---|
| Legit | $\text{Log } [\frac{\pi(X_i)}{1 - \pi(X_i)}]$ | Evenly distributed categories |
| Complementary log-log | $\text{Log } [\text{-Log } (1 - \pi(X_i))]$ | Higher categories are more probable |
| Probit | $\varphi^{-1} [\pi(X_i)]$ | Latent variable normally distributed latent variable |

**Table 2**
Socio-demographic characteristics of patients.

| Socio-demographic characteristics | Mean ± SD or number (percent) |
|---|---|
| characteristics | |
| Age | 52.2 ± 21.4 |
| Gender | |
| Male | 79 (42.2) |
| Female | 108 (57.8) |
| Marital status | |
| Single | 39 (20.9) |
| Married | 108 (57.8) |
| Divorced | 9 (4.8) |
| Widowed | 31 (16.6) |
| Residence | |
| Rural | 129 (69.0) |
| Urban | 58 (31.0) |
| Educational status | |
| No formal education | 116 (62) |
| Attended formal education | 71 (38) |
| Occupation | |
| Farmer | 121 (64.7) |
| Merchant | 12 (6.4) |
| Government employee | 17 (9.1) |
| Retired/unemployed | 30 (16.0) |
| Others | 7 (3.7) |
| Distance to nearby health facility | |
| <5 km | 78 (41.7) |
| 5–10 km | 58 (31.0) |
| >10 km | 49 (26.2) |

to seek health care in 38.5 % of cases.

### 3.3. Treatment seeking delay times

The median delay time of adult heart failure patients admitted to DTCSH was 15 days. The length of delay ranged from one day to six months. About 79.1 % of patients sought professional help in 30 days. The mean length of delay was also calculated to be 25.02 days (SD = 31.3). (Figure: 1). The majority of the respondents (81.6 %) delayed seeking medical attention to see if symptoms would go away. Barriers to timely care were reported to be distance from health care institution (42.2 %), lack of money (41.2 %), fluctuation of symptoms severity (23.8 %), trying other treatment alternatives (20.9 %), and lack of transport (11.9 %).

### 3.4. Functional class of heart failure, length of stay and treatment outcome

The majority (90.9 %) of the respondents had New NYHA functional class IV heart failure at the time of admission (see Table 2). The remaining 7.0 % and 2.1 % were presented with NYHA functional class III and II heart failure respectively. About 84.0 % of the participants improved and discharged from the hospital, whereas 7.5 % died. The length of hospital stay ranged from one to thirty-two days with a median of seven days and a mean length of stay of 7.6 days (SD = 5.1). A chi-square test of independence indicated a significant relationship between treatment seeking delay and treatment outcome ($p = 0.032$) and length of hospital stay ($p = 0.002$) (Table 3).

### 3.5. Factors associated with treatment seeking delay

The candidate link function of the data probit had a small value of AIC (189.94) and BIC (235.03). Therefore, the binary logistic regression model was fitted using the probit link function (Table 4).

Patients admitted with heart failure who were urban residents were 0.6439 (OR = 0.5252; 95 % CI: 0.1746, 0.7893) times less

**Table 3**
Median length of hospital stay, treatment outcome, and chi-square association.

| Variables | Categories | Median delay time | | | $X^2$ p _ values |
|---|---|---|---|---|---|
| | | ≤15 days | >15 days | No (%) | |
| Treatment outcome | Favorable | 91 | 66 | 157 (84.0) | 0.032 |
| | Unfavorable | 11 | 19 | 30 (16.0) | |
| Median length of stay | ≤7 days | 72 | 41 | 113 (60.4) | 0.002 |
| | >7 days | 30 | 44 | 74 (39.6) | |

likely to delay compared to those who live in rural areas. Distance to a health care facility was also found to be associated with treatment seeking delay in heart failure patients. Heart failure patients who live at a distance of ten or less kilometer from health care facility were less likely to delay compared to those who live at a distance of more than 10 km. Patients who had shortness of breath were 2.1447 (OR: 0.1171; 95 % CI: 0.0377, 0.3632) times less likely to be delayed compared to patients who were not presented with shortness of breath. Similarly, patients who had PND and perceived the problem to be heart-related were less likely to delay than those who didn't have PND and perceived the cause to be unrelated to heart, respectively. Significant others recommendations were also found to be associated with treatment seeking delay. For instance, patients who were suggested to get medical services were less likely to delay than patients who were not recommended by significant others to seek health care (Table 5).

## 4. Discussion

We explored treatment seeking delay and associated factors in adult patients hospitalized with heart failure. The findings indicated that patients with heart failure stay home for a long time with its hurting symptoms. This study found a median delay time of 15 days and a mean delay time of 25.02 days, which is very long when compared to other studies. For instance, studies done in Korea and Japan reported median lengths of prehospital delay of 3 days and 5.2 days respectively [8,12]. This might be due to the differences in socio-demographic characteristics among the respondents. For instance, the majority of the respondents in this study were farmers, less educated, and live in rural areas where health facilities are not available near their homes. Another study that included patients hospitalized with acute decompensated heart failure (ADHF) in six medical centers in the United States and two in Canada revealed a median duration of pre-hospital delay of 5.3 h [9]. Although patients included in the study were those with ADHF, the delay time is even shorter than the shortest length of hospital stay reported in the current study.

Significant delays in seeking medical attention were also documented among Ethiopian patients experiencing various health issues. For instance, a systematic review and meta-analysis examining treatment-seeking delays among tuberculosis (TB) patients revealed that the pooled prevalence of treatment-seeking delay at the national level was 44.29 % [17]. A study on health care seeking behavior in rural Ethiopia concluded that delays in care-seeking behavior are apparent mainly for adult-related conditions and among poorer households. However, lack of healthcare utilization was not found to be driven by a low perceived need for modern care [18].

This study found distance and place of residence to be factors in accessing timely care for heart failure symptoms. Urban residents and those living at a ten or less kilometer distance from a health care facility were less likely to delay than rural residents and patients living at a distance above 10 km. This is in line with a study done in Korea that reported shorter prehospital delay in urban residents. However, there was no significant difference in taking pre-hospital actions taken to the symptoms [12].

Ethiopia's public healthcare system utilizes a three-tiered approach to deliver healthcare services, which includes primary (health post, health center, and primary hospital), secondary, and tertiary levels. A study done to assess the estimated travel time to access the Ethiopian health care system found that around 18 % of the population in Ethiopia lacked the ability to reach a public healthcare facility within a 2-h walking distance. This is one of the constraints for effective utilization of health care services [19].

Fatigue and shortness of breath were the symptoms reported by the majority of the respondents who participated in this study. Body swelling, PND, orthopnea, coughing, and chest pain were also reported by a significant proportion of the respondents. The percentages reported in previous studies greatly vary. However, dyspnea was the major presenting symptom in these studies, and fatigue was reported by a lower percentage of patients than in the present study [8,9,12,20].

Studies indicated that some symptoms of heart failure prompted patients to seek care more than others. The study done in Korea reported that lower extremity swelling and coughing were associated with longer prehospital delays than chest pain [12]. Although a very long delay time is found in the present study, patients presented with shortness of breath or PND seek care early than those with fatigue.

Poor symptom perception and inappropriate interpretation are common in patients with heart failure, which affect self-care measures taken to relieve the symptoms. Moreover, a lack of symptom perception also contributes to delayed hospitalization [20]. Previous studies have identified various factors influencing symptom perception and interpretation, such as, knowledge deficits, lack of materials, prior experience of living with heart failure, age, educational status, habits, cultural values, and beliefs [13,21,22]. In the present study, only half (51.3 %) of the respondents perceived their symptoms to be heart-related. Interestingly, perceiving the cause to be heart-related is found to be associated with a relatively short delay time. About 39.6 % of the participants thought the symptoms to be very serious. However, the percentage of respondents who reported seeking health care as a measure for the symptoms is surprisingly low (28.9 %). This supports the idea that good perception alone is not enough for access to healthcare [23]. This study identified an association between significant others suggestions of medical help and a shorter delay time. Heart failure patients believe family support is vital, but sometimes they worry about adding a burden on their lives [24]. The American Heart Association recommends addressing social determinants of health in the care of heart failure patients to reduce delays and improve outcomes [25]. As

**Table 4**
Candidate link function for binary logistic regression.

| Information criteria | Type of link function | | | |
|---|---|---|---|---|
| | Logit | Probit | Complimentary log log | |
| AIC | 190.40 | 189.94 | 190.61 | |
| BIC | 235.49 | 235.03 | 235.69 | 95447 |

**Table 5**

Factors associated with treatment seeking delay in heart failure patients.

| Variables | Estimate | St. Error | P_ Values | OR at 95 % CI |
|---|---|---|---|---|
| **Residence** | | | | |
|   **Rural** | | | | 1 |
|   **Urban** | −0.6439 | 0.2950 | 0.001 | 0.5252 (0.1746, 0.7893) |
| **Distance to health care facility** | | | | |
| **>10 km** | | | | 1 |
|   **5–10 km** | −.5980 | 0.3162 | 0.031 | 0.5499 (0.1781, 0.6975) |
| **<5 km** | −1.7170 | 0.1110 | 0.005 | 0.1796 (0.0535, 0.6033) |
| **Shortness of breath** | | | | |
|   **No** | | | | 1 |
|   **Yes** | −2.1447 | 0.0676 | <0.0001 | 0.1171 (0.0377, 0.3632) |
| **Orthopnea** | | | | |
|   **No** | | | | 1 |
|   **Yes** | 0.5357 | 0.9564 | 0.025 | 1.7087 (1.5704, 5.1184) |
| **PND** | | | | |
|   **No** | −0.823 | | | 1 |
|   **Yes** | | 0.426 | 0.043 | 0.439 (0.171, 0.811) |
| **Perceived cause of illness** | | | | |
|   **Heart unrelated** | | | | 1 |
|   **Heart related** | −1.1651 | 0.1401 | 0.002 | 0.3119 (0.1293, 0.7523) |
| **Significant others response** | | | | |
|   **Suggested medical help** | | | | 1 |
|   **Didn't suggest medical help** | 0.4073 | 0.6901 | 0.005 | 1.502 (1.0104, 1.9273) |

part of proactive care, patients who are at high risk of heart failure should be assessed and counselled to seek early care if they experience symptoms [26].

The vast majority of the respondents (90.9 %) were presented with NYHA class IV heart failure. The median and mean lengths of stays were 7 and 7.6 days, respectively. Studies done in Gondar and Debre Markos, Ethiopia, reported longer stays. The median and mean length of stays reported from Gondar and Debre Markos were 12 days and 17 days, respectively [27,28]. The present study found an in-hospital mortality rate of 7.5 %. This is much lower than the study findings from south west Ethiopia, which obtained an in-hospital mortality rate of 21.3 % [29]. This might be due to differences in the characteristics of patients. The chi-square test indicated that patients who delayed for more than 15 days were more likely to stay long in the hospital and have an unfavorable treatment outcome. Previous studies also revealed that delayed care is associated with a longer hospital stay. However, a significant difference in in-hospital mortality was not reported [30,31].

Access to advanced cardiac interventions is restricted in Ethiopia, with only four facilities offering surgical cardiac care. These include a tertiary public hospital, a charitable organization, and two private centers. The number of cardiac surgeons available is in the single digits, despite a population of 120 million people. As a result, over 15,000 patients are currently waiting for treatment. The combination of delayed presentation and the limited accessibility of cardiology services in the country contributes to cases where individuals pass away before receiving the necessary treatment [32,33].

### 4.1. Strengths of the study

The study provides valuable insights into the reasons behind delays in seeking medical care, specifically in adult heart failure patients. The study identified important factors associated with treatment-seeking delay, such as distance to healthcare facilities and place of residence. These findings have implications for healthcare planning and resource allocation, as they highlight the need for improved access to healthcare services in rural areas and the importance of proximity to healthcare facilities in reducing delays. It emphasizes the importance of addressing social determinants of health, improving symptom perception and interpretation, and proactive assessment and counseling for high-risk individuals. These practical recommendations contribute to the potential impact of the study on improving healthcare delivery and outcomes for heart failure patients.

The study also revealed disparities in the standard of care among heart failure patients. The issue is compounded by delayed patient presentations and inadequate availability of life-saving cardiac interventions within the country. Implementing interventions that enhance early patient engagement with healthcare facilities would result in improved detection of issues at an earlier stage, facilitate prompt initiation of treatment, and potentially slow the progression of cardiac conditions.

### 4.2. Limitations of the study

The study is done in a single hospital, so the sample might not be fully representative of the entire population of heart failure patients in Ethiopia. It is important to consider the potential differences between the study sample and the broader population when interpreting the results.

The study primarily relied on self-reported data, which is susceptible to recall bias. Patients may have difficulty accurately recalling the duration of their treatment-seeking delay or other aspects of their symptoms and experiences. This could impact the accuracy and

reliability of the collected data.

The study primarily relied on quantitative data, which might not capture the nuances and in-depth understanding of patients' experiences and perspectives. Incorporating qualitative methods, such as interviews or focus groups, could provide richer insights into the contextual factors influencing treatment-seeking delays.

## 5. Conclusion

Treatment seeking delay is found to be a big problem in adult patients hospitalized with heart failure. The majority of patients seek health care after many days and even months of delay. A number of internal and external factors were identified as barriers to timely care for heart failure. Lack of perception on ill-health causation, inappropriate significant others responses, living in a rural area, and distance from a health care institution were some of the barriers to seeking timely care in adult heart failure patients. Delayed care contributed to a prolonged length of stay and unfavorable treatment outcomes. Therefore, patients with heart diseases, individuals at risk of heart disease, and their family members must be taught about the symptoms of heart failure and the advantages of timely health care. The public must also be aware of the symptoms of heart diseases.

### Ethics approval and consent to participate

Ethical approval with reference number dtu842/2021 was taken from Debre Tabor University College of Health Sciences. Permission to conduct the study was also obtained from the hospital. Lastly, participants were provided with information about the study and gave their verbal consent to participate.

### Data availability statement

Data included in article/supp. material/referenced in article.

### CRediT authorship contribution statement

**Tekalign Amera Birlie:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Abraham Tsedalu Amare:** Formal analysis, Investigation, Methodology, Software, Validation, Writing – review & editing, Conceptualization, Data curation. **Setegn Bayabil Agegn:** Data curation, Formal analysis, Methodology, Software, Writing – review & editing. **Gebrie Kassaw Yirga:** Data curation, Methodology, Writing – review & editing, Formal analysis. **Berihun Bantie:** Formal analysis, Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing – review & editing. **Tadila Dires Nega:** Data curation, Validation, Visualization, Writing – review & editing, Formal analysis. **Yeshambaw Eshetie:** Investigation, Methodology, Project administration, Supervision, Writing – review & editing. **Tamiru Alene Woelile:** Resources, Software, Validation, Writing – review & editing, Methodology. **Getachew Asmare:** Methodology, Software, Validation, Writing – review & editing. **Alebachew Taye Belay:** Methodology, Resources, Software, Writing – review & editing. **Sheganew Fetene Tasew:** Conceptualization, Data curation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – review & editing.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Abbreviations

ADHF    Acute Decompensated Heart Failure.
DTCSH   Debre Tabor Comprehensive specialized hospita.
NYHA    New York Heart Association.
PND     Paroxysmal Nocturnal Dyspnea.

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