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# COVID-19 outbreak impact on discharge against medical advice from the ED: A retrospective study

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## ABSTRACT

**Background:** The COVID-19 pandemic has profoundly affected the habits of patients, as well as its negative effects on human health. The aim of this study is to investigate the factors associated with discharge against medical advice (DAMA) from the emergency department (ED) during the COVID-19 pandemic.

**Methods:** We conducted a retrospective study of the charts of DAMA cases (pandemic group) between May 1 and October 30, 2021 in a tertiary hospital in Istanbul, Turkey. Our data were compared with DAMA cases between May 1 and October 30, 2019 (pre-pandemic group-control group).

**Results:** During the pandemic period, DAMA cases increased by 24.5% in the ED compared to the previous period. Compared to the pre-COVID-19 period, among DAMA cases during the COVID-19 period, the rate of those arriving by ambulance (10.9 vs. 18.8%), those with one or more comorbid diseases (8.9 vs. 18.4%), those with a high triage level (4.0 vs. 7.4%), those with health tourism or refugee/asylum insurance (2.9 vs. 6.1%), those with trauma (11.5 vs. 19.9%) or alcohol/drug abuse (2.7 vs. 4.0%) increased significantly ( $p < 0.001$ ). It was observed that DAMA cases' waiting times for total ED and from the door to doctor decreased during the pandemic period compared to the pre-pandemic period.

**Conclusion:** During the COVID-19 pandemic period, it was observed that the rate of those with severe disease increased among DAMA cases. Necessary precautions should be taken for all patients, especially seriously ill patients, to feel safe in the hospital and to be treated, and the negative consequences that may develop should be prevented by addressing the concerns of the patients and their relatives.

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## 1. Introduction

Discharge against medical advice (DAMA) is when a patient chooses to leave the hospital before a physician recommends discharge [1]. DAMA is a worldwide prevalent problem in emergency departments (EDs) with global prevalence rates ranging from 0.07 to 20% [2,3]. DAMA can lead to increased patient mortality, increased risk of rehospitalisation, exacerbation of latent diseases, and increased costs [4–6]. DAMA is an emotionally challenging and frustrating event for both the patient and the physician. These patients sue the emergency physician and hospital nearly 10 times as often as the typical ED patient [7].

Previous studies have identified the predictors of DAMA to be race/ethnicity, male gender, lack of health insurance, and a history of alcohol or other substance abuse [8,9]. However, dissatisfaction with medical services due to delays and costs in patient care often leads to DAMA [10].

COVID-19, the pandemic of the century, has profoundly affected the habits of patients as well as the entire health system [11–13]. This

includes ED visits, care and treatment of patients [11–13]. A significant reduction in ED visits for life-threatening acute conditions has been reported during the COVID-19 pandemic [12,14]. Patients may have delayed or avoided medical care because of the risk of catching COVID-19, due to stay-at-home advice, or other reasons. In addition, it appears that there are lack of studies evaluating whether patients who visited the ED during the pandemic have completed their care.

The primary aim of this study was to investigate the impact of the pandemic on DAMA cases. The secondary aim was to compare the factors associated with DAMA cases prior to and during the pandemic.

## 2. Materials and methods

### 2.1. Study design and setting

This retrospective observational, single-center and cross-sectional study was conducted in the ED of a tertiary training and research hospital in Istanbul, Turkey. Every year, approximately 350,000 patients visit the ED, where the study was conducted. It is the primary center for percutaneous coronary intervention and thrombolytic therapy for cardiac and neurological emergencies. Additionally, it is the level 1 trauma

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center and a referral center for oncological emergencies. After the first case of COVID-19 was seen in our country, patients with suspected COVID-19 in our hospital, which was declared a pandemic center by the Ministry of Health, started to be admitted to the study center together with non-COVID-19 patients.

2.2. Ethical approval

This study was approved by the ethics committee of the research institution (Protocol no:2021–528) and the ministry of health. It was conducted in accordance with the Declaration of Helsinki. The need for informed consent was waived due to the retrospective nature of the study.

2.3. Patient selection and groups

The files of all patients who visited the ED between May 1, 2021 and October 30, 2021 were scanned from the hospital electronic system. Adult patients whose medical condition was determined by the physician as “ withdrawal from treatment “ and “ unauthorized absence “ were included in the study [1]. Patients who visit to the ED and leave without being seen (LWBS) by a physician or whose medical condition

was documented as “discharge”, “admission”, “referral” or “death” were excluded from the study.

The patient visits in the same months (May 1, 2019- October 30, 2019) of two years ago were included as the control group to reflect the pre-pandemic period and to make the comparison reliable. The same inclusion and exclusion criteria were used for the control group as well. The flow diagram of study is shown in Fig. 1.

2.4. Data collection

Patients' age, gender, type of transportation to the ED, type of health insurance, when they visit and leave the ED, length of stay (LOS) in the ED, triage code, ICD-10 code defined by the doctor at the first visit, requested consultations and completion times of consultations, whether the patients were under the influence of alcohol or drugs, and the professional experience of the attending physician were recorded. Our data is based on the hospital's electronic system and the doctor's and nurse's notes.

2.5. Outcomes

The primary outcome of this study was to determine the rate of DAMA cases. For the primary outcome of the study, DAMA cases within

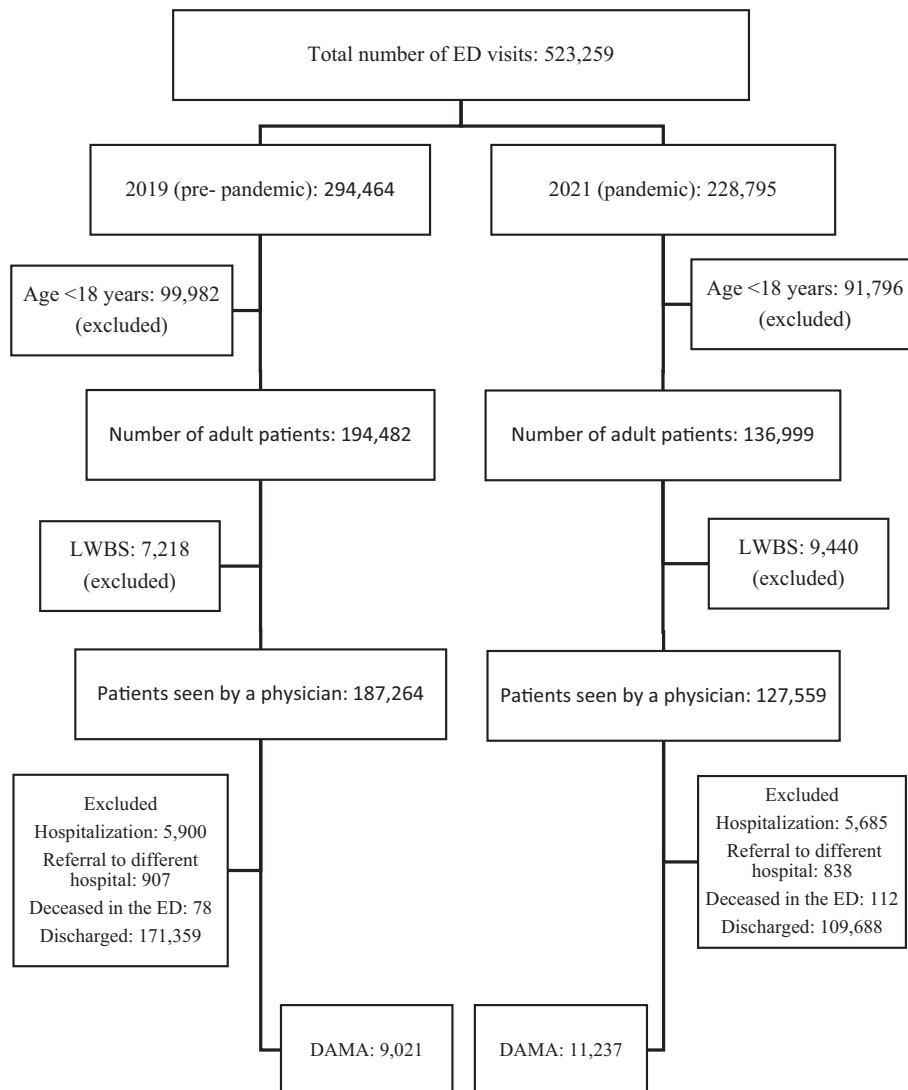


Fig. 1. Flow diagram of the study. DAMA: Discharge against medical advice, LWBS: Leave without being seen by a physician.

an established period were identified and the variables of these cases were “age, number of comorbidities, whether the attendance was in the day or night, type of insurance, time spent in hospital, type of admission, ESI level of patient, ICD-10 diagnoses code, requested consultations, consultation length, experience of the physician providing medical care” were investigated. The secondary outcome of the study was to identify DAMA cases in the prepandemic and pandemic period. For the secondary outcome of the study, DAMA cases were classified into two groups: “prepandemic and pandemic” and the variables above were compared between these two groups.

## 2.6. Statistical analysis

Statistical analysis of the data was performed with IBM SPSS version 23 program (IBM Corp., Armonk, NY). Numerical data were reported as medians and interquartile ranges (25th–75th), while categorical data were reported as frequencies and percentages. Kolmogorov-Smirnov and Shapiro-Wilk tests were used to evaluate the distributions. Independent groups were evaluated by using the independent *t*-test and the Mann-Whitney *U* test. The relationship between categorical variables was evaluated by using the chi-square test. The statistical significance level was determined as  $p < 0.05$ .

## 3. Results

Between 2019 and 2021, adult ED visits decreased by 29.5% from 194,482 to 136,999, while total DAMA cases increased by 24.5% from 9021 to 11,237 ( $p < 0.001$ ) (Fig. 1).

DAMA cases were primarily patients aged 18 to 40 years, insured, low triage code (ESI 3–4), and without comorbid diseases (Table 1).

Among DAMA cases, the proportion of those arriving by ambulance, those with one or more comorbid diseases, those with high triage levels, those with tourist or refugee/asylum insurance, trauma or alcohol/drug abuse increased significantly during the COVID-19 period compared to the pre-COVID-19 period. The proportion of patients with a history of DAMA, which was 1.5% ( $n = 131$ ) the pre-pandemic period, decreased to 0.4% ( $n = 43$ ) during the pandemic period ( $p < 0.001$ ) (Table 2).

During the pandemic period, the number of self-paying patients visiting the ED decreased by 70%. The rate of self-payers among DAMA patients decreased from 2.3% to 0.8% during the pandemic period ( $p < 0.001$ ). However, the rate of DAMA increased from 7.5% to 12.6% in self-paying patients during the pandemic period.

While the median time from door-to-doctor was 17 min (IQR: 2–95 min, mean  $57.9 \pm 78.3$  min) before the pandemic, the median time from door-to-doctor was 15 min (IQR: 5–48 min, mean  $35.4 \pm 49.6$  min) during the pandemic period. While the rate of re-admission was 5.1% ( $n = 461$ ) before the pandemic, this rate decreased to 1.8% ( $n = 204$ ) during the pandemic period ( $p < 0.001$ ). Trauma patients (8.9%) constituted a significant portion of the re-admitted patients (Table 2).

Among DAMA cases, the highest incidence decreases in the pandemic period compared to the previous period was in those with R00-R99 ICD-10 code (52.7 vs 45.8%), and the highest incidence increase was in those with V01-Y98 ICD-10 code (4.2 vs. 9.7%) (Table 3).

Of the DAMA cases, 32% ( $n = 6491$ ) were consulted to specialists from different branches by an emergency medicine specialist, and two or more consultations were requested from 10.4% ( $n = 2102$ ). The most frequently consulted clinics among patients with DAMA were general surgery (7.0%), orthopedics (6.9%), and cardiology (5.2%). While the highest consultation was in general surgery with 8.3% before the pandemic, the highest consultation was in orthopedics with 8.1% during the pandemic period (Table 4).

## 4. Discussion

Patients discharged from EDs with DAMA is a quite concerning issue because it is assumed that these patients leave too early and there may

**Table 1**  
Characteristics of patients discharged against medical advice (DAMA)

	All DAMA patients
Male, n (%)	9599 (47.4)
Age, years, median (25th- 75th)	39 (27–55)
18–29	6120 (30.2)
30–39	4158 (20.5)
40–49	3428 (16.9)
50–59	2583 (12.8)
60–69	1819 (9.0)
70+	2148 (10.6)
Comorbidity conditions, n (%)	
0	17,390 (85.9)
1–2	2092 (10.3)
3+	774 (5.7)
Type of insurance, n (%)	
National health insurance	3556 (17.6)
Employee insurance	15,453 (76.3)
Tourist	492 (2.4)
Refugee/ asylum seeker insurance	457 (2.3)
Self-pay	298 (1.5)
Time of ED presentation, n (%)	
Day shift (20:00–08:00)	9663 (47.7)
Night shift (20:00–08:00)	10,593 (52.3)
Discharge Time, n (%)	
Day shift (20:00–08:00)	10,845 (53.5)
Night shift (20:00–08:00)	9411 (46.5)
Mode of arrival, n (%)	
Self	17,119 (84.5)
Ambulance	3137 (15.5)
Emergency Severity Index, n (%)	
1	0
2	1192 (5.9)
3	14,368 (70.9)
4	4696 (23.2)
5	0
Professional experience of the physician, n (%)	
0–2 years	8284 (40.9)
3–4 years	8125 (40.1)
≥5 years	3847 (19.0)
ED times in mins, median (25th- 75th)	
Door-to-doctor time	16 (3–69)
Total consultation time	81 (40–154)
ED length of stay	143 (84–247)

DAMA: Discharge against medical advice; ED: emergency department, mins: minutes; n: number.

be adverse outcomes following their discharge [15]. Also, discharge-related lawsuits appear to be more common among discharged persons against medical advice. A study conducted by Quinlan and Majoros reported that 0.3% of DAMA cases led to litigation compared to 0.05% caused by regular discharges. [16].

In our study, the rate of DAMA cases was found to be 6.4% in people who were examined by a physician. The reported worldwide prevalence of DAMA ranges from 0.07 to 20% for emergency admissions [7,15,17]. Predictors of DAMA such as younger age, male sex, substance abuse disorders, lack of a personal physician, with low triage acuity scale, and lack of health insurance have also been reported in the literature [15,17].

In addition to the negative effects of SARS-CoV-2 infection on human health, it may affect the hospital admission and treatment processes of patients. Based on this hypothesis, we examined DAMA cases in the ED of our hospital during the pandemic period and the previous period. To our knowledge, our study is the first to examine the impact of the COVID-19 pandemic on DAMA.

Previous studies have reported that ED intensity and prolonged ED dwell times increase the rate of DAMA [18,19]. In our study, the total number of applications to the ED decreased compared to the prepandemic period. In addition, waiting times have decreased during the pandemic period. Despite this situation, it was observed that the rate of DAMA increased in the ED. The reason why people are not keen to wait in the ED during the COVID-19 pandemic compared to

**Table 2**  
Comparison of 2 Groups of DAMA Patients: Those With Pre-pandemic Period Visit Vs. Those With Pandemic Period

	Pre-COVID 19	COVID 19	P
Male, n (%)	4131 (45.8)	5468 (48.7)	<0.001*
Age, years, median (25th- 75th)	40 (28–56)	38 (27–54)	<0.001**
Insurance type, n (%)			
National health insurance	1631 (18.1)	1925 (17.1)	0.077*
Employee insurance	6923 (76.8)	8530 (75.9)	0.165*
Tourist	108 (1.2)	384 (3.4)	<0.001*
The refugee/ asylum seeker	154 (1.7)	303 (2.7)	<0.001*
Self-pay	204 (2.3)	94 (0.8)	<0.001*
Comorbidity conditions, n (%)			
0	8217 (91.1)	9173 (81.6)	
1–2	665 (7.4)	1427 (12.7)	<0.001*
3+	138 (1.5)	636 (5.7)	
Time of ED presentation, n (%)			
Day shift (08:00–20:00)	4129 (45.8)	5534 (49.3)	
Night shift (20:00–08:00)	4891 (54.2)	5702 (50.7)	<0.001*
Discharge Time, n (%)			
Day shift (08:00–20:00)	4435 (49.2)	6410 (57.0)	
Night shift (20:00–08:00)	4585 (50.8)	4826 (43.0)	<0.001*
Mode of arrival, n (%)			
Self	8034 (89.1)	9122 (81.2)	
Ambulance	986 (10.9)	2114 (18.8)	<0.001*
Emergency Severity Index, n (%)			
1–2	364 (4.0)	828 (7.4)	
3	6125 (67.9)	8243 (73.4)	
4–5	2531 (28.1)	2165 (19.3)	<0.001*
Previous DAMA history, n (%)	131 (1.5)	43 (0.4)	<0.001*
Revisit the ED within 72 h, n (%)	461 (5.1)	204 (1.8)	<0.001*
Trauma, N (%)	1034 (11.5)	2014 (17.9)	<0.001*
Alcohol/ drug abuse, N (%)	246 (2.7)	448 (4.0)	<0.001*
Professional experience of the physician, n (%)			
0–2 years	3804 (42.2)	4480 (39.9)	0.001*
3–4 years	4681 (51.9)	3444 (30.7)	<0.001*
≥5 years	535 (5.9)	3312 (29.5)	<0.001*
ED times in mins, median (25th- 75th)			
Door-to-doctor time	17 (2–95)	15 (5–48)	<0.001**
Total consultation time	86 (41–162)	79 (39–150)	0.025**
ED length of stay	151 (80–262)	136 (87–203)	<0.001**

\*Chi-square test; \*\*Mann–Whitney U test; DAMA: Discharge against medical advice; ED: emergency department, mins: minutes; n: number.

the prepandemic may be explained due to the behavioral changes triggered by the risk of catching COVID-19, recommendations made by experts, and information overload/pollution caused by social media [14]. In addition, it may also be due to patients believing they can delay their medical care during this period or that they cannot reach medical care in an overcrowded ED due to the pandemic. All these reasons above may have resulted in the decrease in the duration of DAMA and an increase in its rate.

DAMA was more likely among the younger patients, which is consistent with the findings from other studies [19,20]. Among all DAMA cases, there was a slight predominance of female patients. However, the proportion of male patients was slightly more dominant during the pandemic period, consistent with the literature [19].

In our study, a significant portion of DAMA cases in both periods consisted of patients without comorbidity. This may be because patients with comorbidities are aware of their need for medical support. However, the rate of those with comorbidities in DAMA cases has increased during the pandemic period. In previous studies, the presence of comorbid disease has been reported as one of the risk factors for mortality due to COVID-19 [21,22]. The increased rate of patients with a higher burden of chronic disease in DAMA cases may be due to the fact that these patients prefer not to be in ED where the risk of COVID-19 transmission is high.

In our study, it was observed that there was a decrease in the rate of self-paying patients among DAMA cases during the pandemic period. However, the number of patients paying for themselves in the ED decreased by 70% during the pandemic period. While the rate of DAMA increased (12.6%) in self-paying patients during the pandemic period, the

**Table 3**  
The list of reported ICD-10 code and their frequency among DAMA patients

Diagnosis (by ICD chapter)	2019	2021
Certain infectious and parasitic diseases (A00-B99)	200 (2.2)	228 (2.0)
Neoplasms (C00-D48)	40 (0.4)	21 (0.2)
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D50-D89)	51 (0.6)	30 (0.3)
Endocrine, nutritional and metabolic diseases (E00-E90)	60 (0.7)	41 (0.4)
Mental and behavioral disorders (F00-F99)	67 (0.7)	79 (0.7)
Diseases of the nervous system (G00-G99)	139 (1.5)	114 (1.0)
Diseases of the eye and adnexa (H00-H59)	93 (1.0)	92 (0.8)
Diseases of the ear and mastoid process (H60-H95)	53 (0.6)	28 (0.2)
Diseases of the circulatory system (I00-I99)	218 (2.4)	206 (1.8)
Diseases of the respiratory system (J00-J99)	220 (2.4)	269 (2.4)
Diseases of the digestive system (K00-K93)	332 (3.7)	246 (2.2)
Diseases of the skin and subcutaneous tissue (L00-L99)	119 (1.3)	156 (1.4)
Diseases of the musculoskeletal system and connective tissue (M00-M99)	662 (7.3)	1000 (8.9)
Diseases of the genitourinary system (N00-N99)	359 (4.0)	528 (4.7)
Pregnancy, childbirth and the puerperium (O00-O99)	4 (0.1)	16 (0.1)
Certain conditions originating in the perinatal period (P00-P96)	17 (0.2)	3 (0.1)
Congenital malformations, deformations and chromosomal abnormalities (Q00-Q99)	11 (0.1)	5 (0.1)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00-R99)	4754 (52.7)	5151 (45.8)
Injury, poisoning and certain other consequences of external causes (S00-T98)	829 (9.2)	1131 (10.1)
External causes of morbidity and mortality (V01-Y98)	383 (4.2)	1088 (9.7)
Factors influencing health status and contact with health services (Z00-Z99)	409 (4.5)	804 (7.2)

DAMA: Discharge against medical advice; ICD: International Statistical Classification of Diseases.

rate of self-paying patients in DAMA cases decreased due to the decrease in self-paying patient visits. The decrease in the number of self-paying patients may be due to the fact that patients with or without suspected COVID-19 visit to our hospital's ED, and these patients prefer private health centers near us that do not accept COVID-19 patients.

In previous studies, the most common first admission diagnosis for DAMA cases was associated with gastrointestinal and cardiac complaints [23,24]. In one ICD-10 coded study, the most common ICD-10 codes in DAMA cases were S00-T98 (Injury, poisoning and certain

**Table 4**  
The list of reported consultations and their frequency among DAMA patients

Consultation	2019	2021	P value
Internal medicine	213 (2.4)	285 (2.5)	0.424
Dermatology	20 (0.2)	16 (0.1)	0.183
Infectious diseases	72 (0.8)	28 (0.2)	<0.001
General surgery	753 (8.3)	656 (5.8)	<0.001
Gastroenterology	105 (1.2)	83 (0.7)	0.002
Pulmonology	19 (0.2)	25 (0.2)	0.857
Thoracic surgery	34 (0.4)	0	<0.001
Ophthalmology	169 (1.9)	331 (2.9)	<0.001
Anesthesiology	17 (0.2)	44 (0.4)	0.009
Obstetrics and gynecology	510 (5.7)	521 (4.6)	0.001
Cardiology	514 (5.7)	537 (4.8)	0.003
Otolaryngology	200 (2.2)	271 (2.4)	0.361
Cardiovascular surgery	73 (0.8)	106 (0.9)	0.311
Neurology	375 (4.2)	333 (3.0)	<0.001
Neurosurgery	42 (0.5)	70 (0.6)	0.133
Orthopedics	478 (5.3)	915 (8.1)	<0.001
Psychiatry	16 (0.2)	23 (0.2)	0.659
Urology	75 (0.8)	84 (0.7)	0.501

other consequences of external causes) and R00–R99 (Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified) [25]. Although our study is consistent with the previous study, the proportion of patients with ICD-10 code S00–T98 was lower and the proportion of patients with R00–R99 was higher compared to the previous study [25]. The variable of diagnoses is based on the first impression of physicians. Physicians often record patients' diagnoses before they have completed work-ups. In these cases, ICD codes are recorded as R00–R00 or V01–Y98 based only on symptoms, signs, and injury causes. Furthermore, the episode classification based on the ICD-10 code is not specific enough for individual diseases. Therefore, we used it in consultation data. During the pandemic period, the highest decrease in DAMA cases was in those with general surgery consultation, and the highest increase was in those with orthopedic consultation. However, there has been a significant increase in the rate of trauma cases among DAMA cases during the pandemic period. Since our hospital is a level 1 trauma center, it accepts a large number of trauma patients. Therefore, a high rate of trauma patients can be expected.

However, the number of DAMA adult trauma patients nearly doubled (94.7%) despite a decrease in all adult trauma patient visits during the pandemic period compared to the previous period (4.1%). In the study we carried out in the same center in the early stages of the pandemic, we showed that the ED visits of trauma patients decreased [13]. One of the reasons why trauma patients leave our hospital, which is a level 1 trauma center, before their treatment is completed, or do not want to come, may be that our ED accepts COVID-19 patients.

Saritemur et al. found that in a university hospital setting, 99.1% of DAMA cases had triage levels of –3, 4, or 5 and less than 1% had triage levels of –2 [26]. In our study, which was conducted in an ED visited by a much larger number of patients, the rate of those with triage level-2 was higher. In another study, the rate of patients with triage levels-2 was reported as 24.5% [20]. Results may differ in different geographies and societies. The point we want to draw attention to is the increase in the rate of those with triage level-2 in DAMA cases during the pandemic period in the study we conducted at the same hospital. These results may be an indication that patients with more severe diseases do not want to stay in hospitals during the pandemic process. Previously, Lange et al. stated in their reports that the number of hospital admissions in life-threatening situations decreased during the COVID-19 period [15].

In addition, discharge despite prior medical advice has been identified as risk factors for DAMA [27]. In our study, it was observed that the rate of those with a previous history of DAMA decreased in DAMA cases during the pandemic period. This may indicate that patients without predefined risk factors are also at risk for DAMA during the pandemic.

Finally, in our study, we found that the rate of DAMA was lower in patients treated by doctors with 5 years or more of professional experience. This may indicate that DAMA can be reduced with experience. In the study of Halvaei et al., the rate of those who were satisfied with the factors related to health personnel was found to be higher in those whose physicians were emergency service specialists [28]. In addition, these patients were less dissatisfied with the delay in the delivery of health services. These results may have resulted from the more effective doctor–patient communication and relationship. However, during the pandemic period, the data on experience lost some of its importance. During the pandemic period, significant increases were observed in the proportion of patients treated by physicians with 5 or more years of experience among DAMA patients. However, we would like to state that experienced physicians are faced with such a situation for the first time. For this reason, we believe that physicians and other healthcare professionals should be trained to reduce DAMA rates during epidemics and similar periods when patients do not feel safe in the hospital.

## 5. Limitations

First of all, this is a retrospective study. Our data is based on the hospital's electronic system and the doctor's and nurse's notes in the system. We need more information to explain why patients dropped out and whether there are any negative outcomes for these patients. The term COVID-19 period may not be representative of all periods during the COVID-19 outbreak, as the various “waves” caused by SARS-Cov-2 variants may affect EDs differently. This was a single-site study which also limits generalizability.

## 6. Conclusion

In addition to the increase in the rate of DAMA in the ED during the COVID-19 pandemic period, it was observed that the rate of patients with severe disease among DAMA cases increased. In similar epidemics that may occur in the future, necessary precautions should be taken so that all patients, especially critical patients, can safely apply to hospitals and be treated, and the concerns of patients and their relatives should be addressed. We believe that there is a need for further studies to develop strategies to reduce the number of DAMA cases during pandemic periods.

## Author contributions

HA, and HD worked together in designing the study, collecting and analyzing data, performing and writing the study. All authors approved the submitted version.

## Compliance with ethical standards

Health Sciences University Bakırköy Dr. Sadi Konuk Training and Research Hospital Ethics Committee approved for the study (Ethics Committee protocol number: 2021–528).

This article has not been previously presented at any event (congress, symposium etc.).

## Human rights

The principles set out in the Helsinki Declaration were followed. The need for informed consent was waived due to the retrospective nature of the study.

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## CRedit authorship contribution statement

**Hakan Aydin:** Conceptualization, Data curation, Investigation, Formal analysis, Methodology, Validation, Supervision, Software, Resources, Project administration, Writing – review & editing, Writing – original draft, Visualization. **Halil Doğan:** Data curation, Formal analysis, Methodology, Supervision, Writing – original draft, Writing – review & editing.

## Declaration of Competing Interest

The authors declare no conflict of interest.

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