Uncompleted Emergency Department Care: Patients Who Leave against Medical Advice
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Abstract

Objectives: To compare the patient characteristics, clinical conditions, and short-term recidivism rates of emergency department (ED) patients who leave against medical advice (AMA) with those who leave without being seen (LWBS) or complete their ED care.

Methods: All eligible patients who visited the ED between July 1, 2004, and June 30, 2005 (N = 31,252) were classified into one of four groups: 1) AMA (n = 857), 2) LWBS (n = 2,767), 3) admitted (n = 8,894), or 4) discharged (n = 18,734). The patient characteristics, primary diagnosis, and 30-day rates of emergent hospitalizations, nonemergent hospitalizations, and ED discharge visits were compared between patients who left AMA and each of the other study groups. A Cox proportional hazards model was used to examine the influence of study group status on the risk of emergent hospitalization, adjusted for patient characteristics.

Results: Patients who left AMA were significantly more likely to be uninsured or covered by Medicaid compared with those admitted or discharged (p < 0.001). The AMA visit rates were highest for nausea and vomiting (9.7%), abdominal pain (7.9%), and nonspecific chest pain (7.6%). During the 30-day follow-up period, patients who left AMA had significantly higher emergent hospitalization and ED discharge visit rates compared with each of the other study groups (p < 0.001). Insurance status, male gender, and higher acuity level were also associated with a significantly higher emergent hospitalization rate.

Conclusions: Patients who leave AMA may do so prematurely, as evidenced by higher emergent hospitalization rates compared with those who LWBS or complete their care.

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Uncompleted visits in the emergency department (ED) are a patient safety concern. The two types of uncompleted visits are patients who leave without being seen (LWBS) by a physician and patients who leave the ED against medical advice (AMA). There is a growing literature on patients who LWBS,1–6 perhaps because patients who LWBS are more common than patients who leave AMA, and LWBS visits are associated with ED crowding.7–10 In a nationally representative sample of hospital EDs in 2005, among patients aged 18 years and older who lived in metropolitan areas, approximately 2% LWBS and 1% left AMA.11

Few studies have been conducted on ED patients who leave AMA either in the United States12,13 or elsewhere.14–16 All of the ED studies conducted to date are based on a small sample size and provide relatively little information on the sociodemographic and clinical characteristics of these patients. A study of 139 patients who left AMA from an ED in Scotland found that a high proportion had substance abuse problems (82%).16 Approximately 13% came back to the same ED (follow-up period not reported). In a study of 107 patients with chest pain who left the ED AMA, 13% were hospitalized within three days of their index visit (two with an acute myocardial infarction and one who died from an acute myocardial infarction 12 hours after the AMA visit).13

The purpose of this study was to learn more about patients who leave the ED AMA. To do this, we compared the patient characteristics, clinical conditions, and short-term recidivism rates of ED patients who left AMA with patients who LWBS, as well as with patients who completed care: those admitted to the hospital or discharged home. We hypothesized that patients who left AMA would be similar to patients who LWBS and significantly different from those who completed their
ED care in terms of patient characteristics, clinical conditions, and short-term recidivism rates.

**METHODS**

**Study Design**
We used a retrospective cohort design and characterized all adult patients who presented to the ED of a large teaching hospital during a one-year period into one of four study groups: 1) patients who left AMA, 2) patients who LWBS, 3) patients who were admitted to the hospital, and 4) patients who were treated and released (i.e., discharged). The patient characteristics, primary diagnosis, and 30-day ED recidivism rates following the index visit of the AMA subjects were compared with the other study groups. This study was reviewed and approved by the institutional review board of the study site.

**Study Setting and Population**
The study ED is part of a large university hospital with many tertiary care specialties, including a Level 1 regional trauma center and a state-designated cardiac consultation center. This inner-city teaching hospital also serves as the community hospital for the primarily low-income African American individuals who live in the surrounding neighborhoods. While there are no EDs within walking distance (i.e., less than 0.5 miles) of the study hospital, there are three EDs that are approximately two miles away and can be reached by car within 15–20 minutes.

The ED consists of a main ED, an adjacent urgent care center, and a remote, ED-administered 14-bed observation unit. There is a separate pediatric ED. The adult ED venue has an annual census of approximately 60,000 patient visits. The adult ED is staffed by attending physicians (from one to four at any time), resident physicians (always four), nurses (from 12 to 19), and midlevel providers (from zero to four).

All patients aged 18 years or older who presented to the study ED between July 1, 2004, and June 30, 2005, were eligible. Patients were excluded if they were younger than 18 years of age or the ED discharge disposition was classified as a death, a transfer to a specialty facility, or unknown. During the 12-month enrollment period, there were 55,367 visits to the study ED by 32,391 different patients.

The remaining 31,252 eligible patients were classified into one of four study groups according to the following hierarchy: 1) AMA (n = 857), 2) LWBS (n = 2,767), 3) admitted (n = 8,894), or 4) discharged (n = 18,734). Subjects who had more than one type of visit during the one-year enrollment period were classified according to the above hierarchy. For example, if the subject had an AMA visit and an admitted visit, then the subject was classified into the AMA group and the AMA visit was defined as the index visit. For subjects with more than one of the same type of visit during the enrollment period, the index visit was defined as the last ED visit. For example, if a subject had two AMA visits, one in July 2004 and the other in August 2004, the last visit was defined as the index visit.

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**Figure 1.** Study population flowchart. AMA = against medical advice; LWBS = leave without being seen.
Study Protocol
This study relied entirely on routinely collected patient registration and billing data. The patient registration data are recorded by dedicated and trained ED registration staff. The patient registration database includes each patient’s medical record number; date of birth; gender; race; marital status; employment status; triage level; date and time of ED arrival; and ED disposition.

Upon presentation to the ED, a triage nurse screens and assigns a triage level to each patient. During the study period, the ED used a four-level triage system: level 1 requires immediate treatment, level 2 requires treatment within 30 minutes, level 3 requires treatment within one hour, and level 4 does not require care within a specific time frame. After triage, the patient is interviewed by registration staff to obtain basic demographic data.

Following the patient’s discharge, the registration staff also records the patient’s disposition. An AMA disposition is assigned to patients who have been seen by an emergency physician but leave before completion of their medical care (i.e., during the diagnostic workup, during ED treatment, or because they refuse hospital admission), based on documentation provided by a treating medical provider. The disposition of LWBS is assigned by registration staff to a visit in which the patient is screened by the triage nurse but leaves before being evaluated by a physician. Finally, we refer to those who complete their ED visit as those who are treated and released (i.e., discharged) or admitted to the hospital by an emergency physician.

We used the patient registration data to calculate hourly ED occupancy rates during the study period as a measure of ED crowding. The ED occupancy rate is defined as the ratio of the total number of ED patients to the total number of treatment bays per hour. The numerator included all patients in the ED at any point during each study hour, regardless of where they were in the ED (i.e., in the waiting room, boarding, hallway location, and so on). The denominator included the total number of treatment bays as defined according to the original blueprint of the ED; it did not include hallway beds. ED occupancy rates above 1.0 mean there are more patients in the ED than treatment bays. The higher the occupancy rate, the more crowded the ED.

ED billing data were used to obtain each subject’s insurance status, to identify all return ED visits or hospitalization within 30 days of the index visit, and to determine the primary discharge diagnosis of all study-related ED visits and hospitalizations.

In the ED billing database, the primary discharge diagnosis is coded according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM).17 We used Clinical Classifications Software (CCS), an ICD-9-CM classification system, to group similar ICD-9-CM codes into diagnostic clusters so that we could evaluate AMA rates by diagnosis group. The CCS was originally developed for inpatient diagnosis data; however, it has been validated for ED ICD-9-CM data as well.18

Following determination of the index visit for each eligible subject, the billing data were also used to identify all hospitalizations and ED visits to the same facility within 30 days after the index visit (short-term recidivism). We distinguished between emergent hospitalizations (i.e., those admitted through the ED) and nonemergent hospitalizations (i.e., those admitted through a clinic). We also identified all discharged ED visits within 30 days of the index visit. For subjects who were admitted at the time of their index ED visit, the 30-day follow-up period started on the date of hospital discharge rather than ED discharge. Subjects who were admitted during their index visit and died during the hospitalization associated with their index ED visit were not included in the 30-day follow-up analysis.

Outcome Measures
Patient characteristics, primary discharge diagnosis group, and 30-day emergent hospitalization rates were the main outcomes of this study. Secondary outcomes included 30-day nonemergent hospitalizations, 30-day discharged ED visits, the timing of the return visits/hospitalizations, and whether the index and return admission were related. If the primary diagnosis group of the index and return visit/hospitalization were the same CCS diagnosis group, the two events were considered related.

Data Analysis
SAS version 9.0 (SAS Institute, Inc., Cary, NC) was used for all analyses. First, we compared the patient characteristics, primary diagnosis group, and short-term recidivism rates of the AMA study group with each of the other study groups using a chi-square test. Because we compared multiple groups, we adjusted the p-values for all of the multiple comparisons using the Bonferroni correction method. Therefore, differences were considered statistically significantly different if the corrected p-value was < 0.05 (actual p-value <0.017).

Second, we used a Cox proportional hazards model to examine the influence of study group status on the 30-day emergent hospitalization rate controlling for other patient characteristics. Patient characteristics that were considered in the Cox proportional hazards model included age, gender, race, marital status, employment status, insurance status, and triage level at the time of the index visit. Subjects who died or had discharged ED visits or nonemergent hospitalization were censored at the time of the competing event, because we were interested in estimating the risk associated with emergent hospitalizations that were the first medical event after the index ED visit.

To examine whether the 30-day emergent hospitalization rate varied over time by study group, we included an interaction term of study group status and time. The adjusted hazard ratio and 95% confidence interval for all variables that were statistically significant (i.e., the 95% confidence interval did not include one) are presented for the final model.

RESULTS
Among the 31,252 patients who presented to the study ED during the one-year period, 857 patients had an AMA visit (2.7%) (Figure 1). Subjects who left AMA were significantly different from subjects who were admitted except for gender (Table 1). Compared with
subjects who were admitted, subjects who left AMA were significantly more likely to be uninsured (p < 0.001) and had a lower triage acuity level (p < 0.001). They were also younger (p < 0.001), more likely to be African American, and not married (p < 0.001). Subjects who left AMA also differed significantly from those discharged by all patient characteristics.

Subjects who left AMA were most similar to patients who LWBS in terms of demographic characteristics such as gender, race, marital, and insurance status. Subjects who left AMA had a higher triage acuity level than subjects who LWBS (p < 0.001). ED crowding did not seem to influence patients who left AMA. The largest proportion of subjects who left AMA (32%) arrived...
during a period when the ED was the least crowded (ED occupancy rate, <0.76). In comparison, subjects who LWBS were more likely to leave when the ED was most crowded (35%) (ED occupancy rate, R\textsuperscript{1.26}).

Table 2 displays the top ten ICD-9 diagnosis groups for patients who left AMA and the respective visit rates for those admitted and discharged. The top ten diagnosis groups accounted for 56% of all AMA visits.

Figure 2 displays the short-term recidivism rates by study group. During the 30-day follow-up period, subjects who left AMA were significantly more likely to return to the study ED and be emergently hospitalized (4.4%) compared with those who LWBS (2.6%), were admitted (0.6%), or were discharged (0.1%) (corrected p < 0.05). Subjects who left AMA were significantly less likely to be hospitalized nonemergently (1.2%) compared with those admitted (4.7%) (corrected p < 0.001). Subjects who left AMA were also significantly more likely to return to the ED within 30 days of their index visit and be treated and released compared with each of the other study groups.

Approximately one third of the emergent hospitalizations that occurred to subjects who left AMA (30%) or subjects who were admitted (33%) were related to the index study visit. In contrast, only 13% of the emergent hospitalizations that occurred to those who were discharged were related to the index ED visit.

Table 3 displays the variables that were associated with an emergent hospitalization within 30 days of the index visit. Not only were subjects who left AMA significantly more likely to have an emergent hospitalization after their index visit compared with each of the other study groups, but the risk was highest during the first nine days. Subjects who left AMA were significantly more likely to have an emergent hospitalization within the first nine days compared with subjects who LWBS (adjusted hazard ratio, 0.41; 95% confidence interval = 0.21 to 0.79). Subjects who left AMA also had a higher risk than subjects who were admitted, and this risk remained significantly higher through the first 21 days of the follow-up period. Finally, subjects who left AMA were at significantly higher risk of emergent hospitalization

![Figure 2](image-url)
throughout the 30-day follow-up period compared with those discharged. Other characteristics with significantly higher risk for emergent hospitalization are also listed in Table 3.

Twenty-eight subjects (0.04%) returned to the study facility within 30 days of the index ED visit and either died in the ED or the hospital. The death rate did not vary significantly by study group, and none of the deaths were among patients who left AMA or who LWBS.

### DISCUSSION

Relatively little is known about patients who leave the ED AMA, and the few studies that have been conducted are dated. The purpose of this study was to describe a large cohort of ED patients who left AMA by comparing them with those who did not in terms of patient and clinical characteristics and short-term recidivism rates. In general, patients who left AMA were most similar to patients who LWBS. However, ED crowding does not appear to influence patients who leave AMA as much as it does those who LWBS. Patients who left AMA were significantly more likely to return to the ED within 30 days of their index visit and be emergently hospitalized or discharged compared with each of the other study groups.

The ED AMA rate (2.7%) we observed is higher than the rate among a national sample of hospital EDs located in metropolitan areas (1.3%),11 which is most likely due to two reasons: 1) the denominator for our rate is the number of unique patients, excluding repeat visits of the patients, rather than total visits as used in the national data; and 2) the higher AMA rate observed at our ED may be related to the lower socioeconomic status of the majority of our patients. Studies of hospitalized patients have found that hospitals that primarily serve a low-income population have higher AMA discharge rates22,23 compared with hospitals that primarily serve a middle to upper income population.24

Patients who left AMA were significantly more likely to be covered by Medicaid or be uninsured compared with those who completed their ED care. This finding is consistent with studies of hospitalized patients who leave AMA, which reported a twofold to threefold increase in AMA discharges among those uninsured or covered by Medicaid.23,24

Some of the leading clinical diagnoses associated with high AMA visit rates, such as nonspecific chest pain, abdominal pain, headache, or nausea and vomiting, often involve prolonged workups to rule out life-threatening conditions and/or invasive test procedures that patients may decide are not worth the wait and/or discomfort. In this study, ED patients diagnosed with an alcohol-related disorder also had higher AMA rates compared with patients with other clinical conditions. Patients with an alcohol-related problem may have more difficulty complying with treatment recommendations because of addiction-seeking behaviors and/or impaired judgment.

Patients who left AMA had higher short-term emergent hospitalization rates compared with those who LWBS, as well as those who completed their ED care. These results suggest that patients who leave the ED AMA do so prematurely. Either they have not received complete treatment or they are still clinically symptomatic when they decide to leave. This is further supported by the fact that the emergent hospitalization rate varied significantly over time for subjects who left AMA. If the AMA patients were sicker than the other study groups, the 30-day emergent hospitalization rate would have remained significantly higher throughout the 30-day follow-up period; this did not occur except in comparison with those discharged.

Because patients who leave AMA most likely do so prematurely (relative to their medical workup), emergency physicians should do everything possible to prevent the occurrence of AMA visits. Preventive measures could include a full explanation to the patient of the potential adverse consequences of leaving AMA, enlisting family members and other treatment providers in the decision-making process, giving patients time to think about their decision, and negotiating alternate treatment strategies that may be acceptable to both the patient and the treatment team. While these preventive measures seem reasonable, an intervention trial would determine their effectiveness in reducing AMA visits among ED patients.

### LIMITATIONS

The results of the study must be interpreted in the context of the following limitations. First, this study was based on the experience of a single institution that primarily treats a socioeconomic disadvantaged population. Our results may not be generalizable to EDs that largely serve middle and upper income patients. Given
the few studies that have focused on patients who leave AMA, it would be useful to replicate this study in other EDs. Second, there may be other characteristics that are important to consider when delineating patients who leave AMA from those who do not that were unavailable to us, such as a history of alcohol or drug abuse or lack of a primary care provider. Third, the ED diagnoses for patients who leave AMA were based on incomplete medical care; therefore, the diagnoses may not have been accurate. Fourth, we only measured recidivism to the same facility; we were not able to measure hospitalizations or ED visits that occurred at other facilities within the 30-day follow-up period. Fifth, we were only able to determine short-term mortality that occurred in the study facility during the follow-up period. We could not ascertain the occurrence of deaths that may have happened elsewhere. Finally, this study did not determine the reasons why patients left the ED AMA.

CONCLUSIONS

Our study suggests that patients who leave AMA represent a small but important subgroup of ED patients. Even after controlling for patient characteristics, patients who leave AMA have higher short-term recidivism rates compared with those who LWBS or who complete their ED care.

References