

Patients Who Leave Without Being Seen: Their Characteristics and History of Emergency Department Use

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Study objective: We identify patient characteristics associated with uncompleted visits to the emergency department (ED).

Methods: We used registration and billing data to conduct a pair-matched case-control study. ED patients who left without being seen (cases) between July 1 and December 31, 2004, were matched to patients who stayed and were treated (N=1,476 pairs) according to registration date and time (± 2 hours) and triage level (controls). The association between sociodemographic characteristics, previous ED utilization, and proximity to the ED and the risk of an uncompleted visit was assessed by the odds ratio (OR) using conditional logistic regression.

Results: During the 6-month study period, the overall left-without-being-seen rate was 6.4%. Seventeen percent of cases compared with 5% of controls had at least 1 previous uncompleted visit during the previous year. After adjusting for all patient characteristics, younger age, being uninsured (adjusted OR=1.73; 95% confidence interval [CI] 1.35 to 2.21) or covered by Medicaid (adjusted OR=1.67; 95% CI 1.27 to 2.20), and a previous uncompleted visit (adjusted OR=3.60; 95% CI 2.67 to 4.85) were significantly associated with the risk of an uncompleted visit.

Conclusion: Previous ED utilization is predictive of future ED utilization. EDs should make every effort to keep their left-without-being-seen rates to a minimum because patients who are the least likely to receive care elsewhere (ie, those uninsured or covered by Medicaid) are more likely to leave without being seen. [Ann Emerg Med. 2006;48:686-693.]

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INTRODUCTION

Background

During the past decade, emergency department (ED) crowding has become a prevalent and worsening problem in the United States and other countries.¹⁻⁶ There is a growing concern that patient safety is being compromised.⁷⁻¹⁰ One of the ways that ED crowding can harm patient safety is when patients leave without being seen by a physician. When crowding occurs, patients wait longer. The longer they wait, the more likely they are to leave without being seen.¹¹⁻¹⁵ A small but significant proportion of patients who leave without being seen have persistent problems that can jeopardize their health.^{13,14}

Rates of leaving without being seen are higher during periods of increased ED volume, as well as when the overall patient

acuity (ie, greater proportion of trauma/admitted patients) in the ED is elevated.^{11,12,16,17} Rates of leaving without being seen are also higher among larger hospitals, teaching hospitals, and hospitals that treat a high proportion of uninsured patients.^{1,11}

Although lower patient acuity has consistently been associated with more uncompleted visits, the relationship with other patient characteristics is unclear.^{13-15,18,19} For example, a cohort study conducted in the United Kingdom with 5,512 patients who left without being seen found that younger patients were significantly more likely to leave compared with older patients.¹⁸ In contrast, 2 studies conducted in the United States did not find any relationship between uncompleted visits and age.^{13,14} The conflicting results among the studies conducted to date are due to differences in study design, patient

Editor's Capsule Summary

What is already known on this topic

System factors, such as wait time, contribute to patients leaving the emergency department (ED) without being seen.

What question this study addressed

What patient factors contribute to leaving without being seen? Specifically, among patients who present to the ED on the same day, at the same time, with the same acuity, what differentiates patients who stay and are treated from those who leave without being seen?

What this study adds to our knowledge

In this single-site study of 1,476 case-control pairs, younger age, being either uninsured or covered by Medicaid, and having a history of uncompleted visits were all associated with a higher likelihood of leaving without being seen. The strong association between insurance status and leaving without being seen is particularly concerning, given the greater difficulty uninsured patients and Medicaid beneficiaries have accessing care elsewhere.

How this might change clinical practice

Uninsured patients and those who are insured by Medicaid may be more likely to leave without being seen than privately insured patients despite that they have fewer alternative options for care. The contribution of previous uncompleted visits is poorly understood, and more research is needed to know how best to direct greater efforts toward reductions in leaving-without-being-seen rates.

populations, and risk factors examined. Only 2 of the studies controlled for the ED environment, as well as patient acuity, when identifying patient characteristics associated with uncompleted visits. One of the studies matched 30 patients who left without being seen to 14 who did not, according to age, sex, urgency of complaint, and time of ED presentation, but the sample size was too small to draw any rigorous conclusions.¹⁹ The other used multivariate regression techniques to control for the time of ED presentation and acuity when different patient characteristics were evaluated.¹⁸ However, because the study was conducted in the United Kingdom, major differences in the health care system there could cause different patient characteristics to be associated with uncompleted visits compared with those in the United States.

Importance

Although past studies have identified specific hospital characteristics that are associated with uncompleted visits, it is still unclear what patient factors are important. Most of the

previous research that examined patient characteristics associated with uncompleted visits has been largely descriptive or conducted outside the United States. This study examines the association between different patient factors such as sociodemographic characteristics, past ED utilization, and proximity of residence to the ED on the risk of an uncompleted visit. By knowing more about patients who left without being seen, we will have better insight into the potential patient safety issues associated with these types of ED visits.

Goals of This Investigation

The purpose of this study was to identify patient characteristics associated with uncompleted visits, controlling for the ED and hospital environments, as well as the clinical urgency of the patients. To do this, patients who left without being seen (cases) were matched to patients who stayed and were treated (controls) by their registration date and time and triage level. The study was designed to answer the following question: among patients who present to the ED on the same day, at the same time, with the same acuity, what differentiates patients who stay and are treated from those who leave without being seen?

MATERIALS AND METHODS

Study Design

We used a pair-matched case-control design to examine the influence of different patient characteristics on the likelihood of an uncompleted visit during a 6-month period. Cases were matched to controls according to registration date and time (± 2 hours) and triage level. By matching on registration date and time, the matched case-control pairs experienced similar hospital and ED conditions at their ED visit. In addition, we matched on triage level so that we could focus on patient characteristics other than clinical urgency that influence patients' likelihood of an uncompleted visit. This study was reviewed and approved by the institutional review board of Johns Hopkins University School of Medicine.

Setting

The setting for this study was an adult ED that is part of a large university hospital with many tertiary-care specialties, including a Level I regional trauma center and a state-designated cardiac consultation center. The study ED consists primarily 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 annual census of the adult ED is approximately 60,000. The study ED primarily serves a socioeconomically disadvantaged black community.

Selection of Participants

Cases and controls were identified through a patient registration database that records all patient visits to the ED. All patients who presented to the ED between July 1 and December 31, 2004, were eligible for the study. Subjects were excluded for

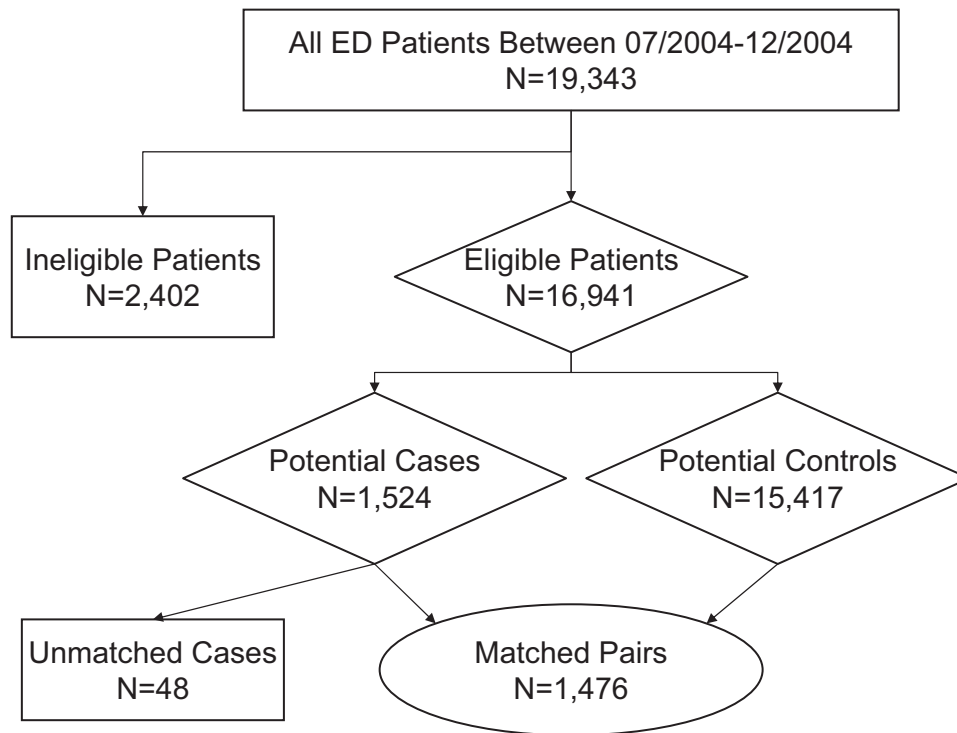


Figure. Identification and selection of cases and controls.

Table 1. Distribution percentage of matching variables.

| Matching Variables | Cases, % (N=1,476) | Controls, % (N=1,476) |
|--------------------------|-----------------------|--------------------------|
| Registration date | | |
| Monday | 15 | 15 |
| Tuesday | 15 | 16 |
| Wednesday | 17 | 16 |
| Thursday | 12 | 14 |
| Friday | 15 | 15 |
| Saturday | 13 | 11 |
| Sunday | 13 | 13 |
| Registration hour | | |
| 7:01 AM to 3 PM | 19 | 18 |
| 3:01 PM to 11 PM | 42 | 49 |
| 11:01 PM to 7 AM | 39 | 33 |
| Acuity level | | |
| 1 (Sickest) | 1 | 1 |
| 2 | 30 | 30 |
| 3 | 68 | 68 |
| 4 | 1 | 1 |

the following reasons: (1) younger than 18 years at their ED visit; (2) not a state resident; or (3) the ED disposition classified as a death, left against medical advice, transferred to a specialty ED within the hospital system, or missing. During the 6-month observation period, 19,343 patients presented to the ED, and 16,941 (87.6%) were eligible (see the Figure). Of the 2,402 ineligible patients, 41% were excluded because of reasons

related to ED disposition, 34% were not state residents, and 25% were younger than 18 years.

All eligible patients who presented during the 6-month observation period and had an uncompleted visit were selected as cases. If a case had more than 1 uncompleted visit during the 6-month period, the most recent uncompleted visit was used as the index visit. The sampling frame for controls consisted of all remaining patients in the registration database who presented to the ED during the same period and were discharged (ie, treated and released) or admitted to the hospital. We used Statistical Analysis Software, version 9 (SAS, Cary, NC) to randomly select a control from the eligible pool of controls. Each case was matched to 1 control according to the case’s registration date and time (± 2 hours) of index visit and triage level. The study hospital uses a 4-level triage system: level 1 requires immediate treatment, level 2 requires treatment within 30 minutes, level 3 requires treatment within 1 hour, and level 4 does not require care within a specific period.

Of the 1,524 eligible cases, we successfully matched 1,476 of the cases (97%) to a control (Table 1). The average difference in registration time between the cases and controls was 62 minutes (SD=35 minutes). The 48 cases that we were unable to match were dropped from the analysis. These 48 unmatched case patients were more likely to arrive during the nightshift (ie, between 11:01 PM and 7 AM) (56%) compared with the matched case patients (39%) and to be assigned the lowest triage level (63% versus 1%, respectively).

Methods of Measurement

The study relied on routinely collected patient registration and billing data. The patient registration database includes each patient's medical record number, date of birth, sex, race, marital status, home address, employment status, triage level, date of registration, time of registration, and ED disposition. This information is recorded by dedicated and trained ED registration staff. We merged the patient registration database with the billing database by using the patient's medical record number and date of registration to obtain the patient's insurance status for the index ED visit from the billing database.

In addition to the basic sociodemographic characteristics that are included in the registration and billing databases, we also measured subjects' proximity of residence to the study ED, as well as previous visits to the study ED during the past year. To determine how far a subject lived from the study ED, subjects' addresses were geocoded with ArcView GIS software, version 9 (ArcView Geographic Information Systems, Redlands, CA). The proximity to the ED was measured by the linear distance between each subject's residence and the ED. When we could not match subjects' addresses in ArcView (9%), we assigned the average distance of the corresponding zip code. We created 4 categories of proximity: less than 0.5 mile (walking distance), 0.5 to 1 mile (no other ED providers), 1 to 5 miles (city resident), and greater than 5 miles (non-city resident).

We used data from the registration database to determine how many ED visits each subject had had during the previous year before their index visit to the study ED. More specifically, for each subject, we determined the total number of uncompleted visits, discharged ED visits, and admitted ED visits during a 1-year period before the index ED visit.

Primary Data Analysis

To examine the association between each of the patient characteristics and the risk of an uncompleted visit, we conducted univariate conditional logistic regression. After the univariate analysis, we entered all variables into a multivariable conditional logistic regression model to calculate the adjusted, matched-pair odds ratio (OR) and 95% confidence interval (CI) for each patient characteristic, controlling for other variables in the model.²⁰ A possible interaction effect between previous admitted and discharged visits was tested. Although we could not examine the main effect of acuity on the risk of an uncompleted visit because we matched on it, we tested the interaction of insurance status and acuity for acuity levels 2 and 3 (the sample sizes were too small for examining the interaction in levels 1 and 4). Only multivariate regression results are displayed because the univariate results are not adjusted for other variables in the model. We repeated the multivariable conditional regression model among a subgroup of 1,155 matched pairs that included only control patients who were discharged so that we could determine whether the results differed according to whether the cases were matched to only patients discharged versus those discharged or admitted.

For each variable that was significant in the multivariable model, we also calculated the population attributable risk, which represents the proportionate excess risk associated with exposure to a risk factor. The population attributable risk combines the magnitude of the risk and the prevalence of the risk factor to estimate the fraction of all cases associated with the risk factor.²¹ Usually, the population attributable risk is based on the relative risk; however, when the relative risk cannot be obtained directly, the OR can be used when the outcome is rare (ie, <10%).²² To ensure that the OR approximated the relative risk, we examined the potential bias by using a method of correcting the OR developed by Zhang and Yu.²² Because the bias affected (ie, 20%) the relative risk estimate for one of the significant variables, we used the corrected ORs to estimate the relative risk and to calculate the population attributable risk for all significant variables in the multivariate analysis.

RESULTS

During July 1, 2004, to December 31, 2004, the overall uncompleted visit rate for the study ED was 6.4%. The uncompleted visit rate was highest during July (8.1%) and lowest during December (4.1%) ($P<.001$). It was also highest on Wednesdays (7.5%) and lowest on Saturdays and Sundays (5.5%) ($P=0.001$). There was a strong dose-response relationship between the uncompleted visit rate and triage acuity: 0.1% of level 1 (sickest), 4.9% of level 2, 8.1% of level 3, and 15.2% of level 4 (least sick) ($P<.001$).

Table 2 presents the percent distribution and adjusted odds of an uncompleted visit by different patient characteristics. Overall, the study sample was relatively young (41 years; range 18 to 95 years), predominantly black (78%), and either uninsured (39%) or insured by Medicaid (28%). Cases were significantly younger than controls (39 versus 43; $P<.001$).

After adjustment for all patient characteristics displayed in Table 2, age, insurance status, and ED visit history were significantly associated with an increased risk of an uncompleted visit (see adjusted ORs in Table 2). Patients 55 years of age and older had a decreased risk of an uncompleted visit (OR=0.61; 95% CI 0.43 to 0.85) relative to patients aged 18 to 24 years. Patients who were uninsured (OR=1.73; 95% CI 1.35 to 2.21) or insured by Medicaid (OR=1.67; 95% CI 1.27 to 2.20) had a significantly higher risk of an uncompleted visit compared to subjects with commercial insurance. There was no significant interaction effect between insurance status and acuity level. The excess risk of an uncompleted visit associated with being uninsured is 18%, as estimated by the population attributable risk. Likewise, the excess risk of an uncompleted visit is 12.7% for patients covered by Medicaid.

There was also a strong dose-response relationship noted between the risk of an uncompleted visit and a history of uncompleted visits (see Table 2). The greater the number of uncompleted visits during the year before the index ED visit, the higher the risk of an uncompleted visit during the 6-month study period. Compared with patients with no uncompleted visits during a 1-year period before the index ED visit, the

Table 2. Distribution percentage of patient characteristics and adjusted OR of an uncompleted visit.

| Characteristics | Cases (N=1,476) | Controls (N=1,476) | Adjusted OR (95% CI)* |
|---|-----------------|--------------------|-----------------------|
| Age, y, % | | | |
| 18–24 | 18 | 15 | 1.00 |
| 25–34 | 22 | 21 | 0.96 (0.74–1.25) |
| 35–44 | 28 | 24 | 1.05 (0.80–1.37) |
| 45–54 | 21 | 22 | 0.77 (0.58–1.03) |
| ≥55 | 11 | 18 | 0.61 (0.43–0.85) |
| Mean (range) | 39 (18–85) | 43 (18–95) | |
| Sex, % | | | |
| Female | 52 | 53 | 1.00 |
| Male | 48 | 47 | 0.99 (0.84–1.17) |
| Race, % | | | |
| White/other | 19 | 25 | 1.00 |
| Black | 81 | 75 | 1.24 (1.00–1.54) |
| Marital status, %[†] | | | |
| Not married | 87 | 82 | 1.00 |
| Married | 13 | 18 | 0.94 (0.73–1.20) |
| Employment status, %[†] | | | |
| Not working | 66 | 61 | 1.00 |
| Working | 34 | 39 | 0.95 (0.78–1.16) |
| Proximity to ED, %[†] | | | |
| <0.5 mile | 13 | 10 | 1.00 |
| 0.5–1 mile | 28 | 27 | 0.83 (0.63–1.10) |
| 1–5 miles | 43 | 43 | 0.82 (0.63–1.07) |
| ≥5 miles | 16 | 20 | 0.83 (0.60–1.15) |
| Insurance Status, %[†] | | | |
| Commercial | 16 | 26 | 1.00 |
| Medicare | 9 | 13 | 1.23 (0.86–1.76) |
| Medicaid | 31 | 26 | 1.67 (1.27–2.20) |
| No insurance | 44 | 35 | 1.73 (1.35–2.21) |
| Uncompleted ED Visits in Preceding Year, % | | | |
| 0 | 83.3 | 94.8 | 1.00 |
| 1 | 10.5 | 4.4 | 2.79 (1.99–3.91) |
| 2 | 2.7 | 0.5 | 7.72 (3.01–19.79) |
| 3 | 1.4 | 0.2 | 12.47 (3.29–47.33) |
| ≥4 | 2.1 | 0.1 | 48.02 (6.40–360.10) |
| Mean (range) | 0.4 (0–38) | 0.1 (0–5) | |
| Admitted ED Visits in Preceding Year, % | | | |
| 0 | 83.8 | 81.2 | 1.00 |
| ≥1 | 16.2 | 18.8 | 0.71 (0.56–0.89) |
| Mean (range) | 0.3 (0–26) | 0.4 (0–9) | |
| Discharged ED Visits in Preceding Year, % | | | |
| 0 | 54.7 | 57.3 | 1.00 |
| ≥1 | 45.3 | 42.7 | 0.88 (0.74–1.05) |
| Mean (range) | 1.7 (0–72) | 1.2 (0–32) | |

*OR estimated by multivariate conditional logistic regression (N=1,375), controlling for all other variables in this table.

[†]Less than 4% of pairs had missing data on this characteristic.

adjusted OR for patients with 1 or more previous uncompleted visits was 3.60 (95% CI 2.67 to 4.85). The population attributable risk or the excess risk of an uncompleted visit associated with a history of an uncompleted visit during the preceding year was 7.9%. Finally, subjects who had at least 1 previous ED visit within the past year that resulted in a hospital admission were at significantly less risk of an uncompleted visit (OR=0.71; 95% CI 0.56 to 0.89) compared with subjects who had no previous ED visits that resulted in admission during the past year.

When the analysis was repeated among the subgroup of 1,155 matched pairs that included only controls with a discharged ED visit, subjects who were uninsured or covered by Medicaid, as well as subjects with a history of 1 or more uncompleted visits, remained at higher risk of an uncompleted visit during the study period (data not shown). Younger age and a history of an ED visit that resulted in admission were no longer significant. However, subjects with a history of at least 1 ED visit that resulted in discharge were significantly less likely to have an uncompleted visit (OR=0.78; 95% CI 0.64 to 0.95)

compared with subjects with no history of a discharged ED visit within the past year (data not shown).

LIMITATIONS

The results of this study must be considered in light of the following limitations. First, we were limited to examining exposure variables that are routinely collected in the patient registration and billing databases. For example, Goodacre and Webster¹⁸ found that patients who did not arrive by ambulance were significantly more likely to have an uncompleted visit compared with those who did. We were unable to examine this factor because mode of arrival is not recorded in either database available to us. Second, when examining the influence of ED visit history on the risk of an uncompleted visit, we were able to ascertain subjects' ED visit history only at the study hospital; it is unclear how patients' use of other hospital EDs may affect their risk of an uncompleted visit at the study hospital. Third, the findings of our study cannot be generalized to the most or the least sick patients because we had too few matched pairs in these 2 extreme acuity categories (ie, levels 1 and 4 triage patients). Finally, the results of this study may not be generalizable to EDs with a dissimilar hospital environment (ie, large teaching hospital) or patient population (ie, high proportion of uninsured and Medicaid patients).

DISCUSSION

Hospital EDs have become an integral component of the United States' health care safety net.^{23–26} Initially developed to treat patients with life-threatening conditions, they have evolved into facilities that also treat patients for a variety of unplanned, nonemergency but needed health care services.²⁶ Emergency medicine has become a specialty that “bridges primary and specialty services, offering elements of both while maintaining a unique position of ready access and availability.”²⁵ Moreover, emergency physicians provide care to all patients, regardless of their medical condition, age, or ability to pay. A disproportionate share of minority patients, as well as patients who are uninsured, seek care in the ED compared with other ambulatory care settings.²³

Numerous factors, including rising patient volume, fewer hospital and community resources, and significant changes in the type and treatment of patients who present to the ED, have resulted in many EDs nationwide commonly operating at a capacity far beyond what was intended.^{1,6,7,27–29} One of the consequences of ED crowding is that patients may leave without being seen by a physician. At this study ED, the uncompleted-visit rate was 6.4% for the last 6 months of 2004. Although this rate is higher than in many community hospital EDs nationwide, it is not atypical for an ED that is located in a highly populated urban area that serves a high proportion of safety-net patients.¹

The most common reason reported by patients who decide to leave without being seen by a physician is that the wait is too long.^{1,12–15} Some argue that because EDs triage patients, those

who wait the longest are generally the least sick and can medically afford to wait the longest. However, studies of patients who leave without being seen, including this one, have found that a significant proportion (usually greater than 25%) are characterized as needing emergency or urgent medical care.^{13,14} As Kellermann³⁰ stated almost 15 years ago, “much of the burden of walk-in use of hospital EDs may be due to unmet need rather than inappropriate use.”

This study identified specific characteristics of the patient that increased the risk of an uncompleted visit. Lack of health insurance, Medicaid coverage, younger age, and a history of at least 1 uncompleted visit during the preceding year all significantly increased the risk of an uncompleted visit during a 6-month observation period. The most important patient characteristic associated with an uncompleted visit was insurance status. Subjects who were uninsured or covered by Medicaid were significantly more likely to have an uncompleted visit compared with subjects covered by commercial insurance. The excess risk associated with being uninsured or covered by Medicaid was 18% and 12.7%, respectively. Although the strength of the association was stronger between a previous uncompleted visit and a future one compared to insurance status (as measured by the OR), the impact of insurance on uncompleted visits is greater because a much higher proportion of the subjects were uninsured or covered by Medicaid compared with having a history of an uncompleted visit. The impact of insurance on the risk of an uncompleted visit did not vary significantly by acuity level. These results are disturbing because patients who are uninsured or covered by Medicaid often have limited access to medical care elsewhere.^{31,32} Barriers to timely care elsewhere could result in a serious, adverse patient outcome for these subgroups of patients who are at higher risk of an uncompleted visit.

This study also found a relationship between past and future ED utilization. Subjects who had 1 or more uncompleted visits during the past year were at significantly higher risk of an uncompleted visit during the 6-month observation period compared with subjects with no uncompleted-visit history. Although there was a strong relationship between a previous uncompleted visit and a future one, the excess risk associated with a history of an uncompleted visit was only 7.9% because relatively few subjects have a history of an uncompleted visit. When the analysis included all control patients who were admitted or discharged, a history of an ED visit that resulted in an admission reduced the risk of an uncompleted visit. When the analysis was limited to only control patients who were discharged, a history of an ED visit that resulted in a discharge also reduced the risk of an uncompleted visit. These associations all suggest that past ED utilization is a good predictor of future use and is consistent with other types of studies that have also found a strong relationship between past and future use of health care services.^{33–36}

As did Goodacre and Webster,¹⁸ we found that younger patients were significantly more likely to leave without being

seen compared with older patients. As did the UK study, we did not find an association between the proximity of residence to the ED and an uncompleted visit after controlling for other factors. Unlike Goodacre and Webster,¹⁸ as well as another study conducted in the United States, we did not find a relationship between male sex and the risk of an uncompleted visit.¹³

In conclusion, this study found that there are significant differences in age, insurance status, and ED history between patients who leave without being seen and those who stay and are treated, after elimination of potential differences in the ED and hospital environment, as well as the clinical urgency of the visit. Furthermore, our results suggest that it is the patients with more barriers to care elsewhere (ie, those uninsured or covered by Medicaid) who are most likely to leave without being seen. Patients who leave without being seen are a potential safety hazard to themselves and to the hospital. As emergency medicine providers, we must continue to devise ways to improve the quality of the care we provide to the communities we serve.

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