

## Articles

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# A Rural Emergency Department

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**The appropriate use of emergency departments is of growing concern. By knowing which patients are more likely to make inappropriate visits to these departments, efforts can be directed to encourage more suitable care. Our study was done in a rural county hospital in eastern New Mexico. Data were collected from all emergency department visits over a 4-week period. Patient and physician questionnaires were administered to assess aspects of emergency department use, including appropriateness based on published criteria, physicians' opinion of appropriateness, groups who made inappropriate visits, and the perception of the need for and the urgency of a visit. We found that 32% of visits were inappropriate based on published criteria and 24% were considered inappropriate by physician opinion. Two groups with a high rate of inappropriate visits were Hispanics and Medicaid recipients. Patients and physicians have differing opinions of the urgency of a visit and of how soon medical treatment is required. To decrease the frequency of inappropriate use of emergency departments, educational efforts should be focused on the subgroups with high rates of such use.**

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**W**hat is an emergency? The answer depends on whom you ask, whether it be a patient or a physician. In numerous studies done to determine appropriate emergency department (ED) use, various criteria were used to determine appropriateness, such as "threat to life and limb" and physician opinion,<sup>1,2</sup> but most did not take into account patients' perception of an emergency. The American College of Emergency Physicians sees this as an important element in determining an appropriate ED visit. In a 1982 policy statement by the American College of Emergency Physicians, a visit to an ED was appropriate in the following circumstances<sup>3(p672)</sup>:

An unforeseen condition of a pathophysiological or psychological nature develops which a prudent lay person, possessing an average knowledge of health and medicine, would judge to require urgent and unscheduled medical attention most likely available, after consideration of possible alternatives, in a hospital emergency department.

Appropriateness, ED population demographics, and patient and physician perceptions are the subjects of this study. Because patients' and physicians' definitions of emergency may differ, it is predictable that their perceptions of the urgency of a visit and the time frame for the need of treatment would also differ. We attempt to quantify these differences. Although previous studies have examined various aspects of ED use, most have been conducted in large hospitals in urban areas. This study is unique in that it was carried out in a rural county hospital in eastern New Mexico.

Using a prospective study design, we examined several aspects of ED use: the appropriateness of visits as de-

termined by criteria and physician opinion, subgroups with a higher-than-average number of inappropriate visits, and the differences between patients' and physicians' perceptions of the urgency of a visit and the time frame needed for treatment.

This study was conducted at the ED of the county hospital, Roosevelt General Hospital, in Portales, New Mexico. This 40-bed hospital is the only hospital in the county. The next closest hospital is in Clovis, New Mexico, about 20 miles away. Visits to the ED of Roosevelt General Hospital in 1991 totaled 6,210, with a mean of 17.0 visits per day. Portales has a population of about 11,000 in a rural county of 17,000. There are 13 physicians in the city, all of whom see Medicare and Medicaid patients in the ED. If a physician is on duty for the ED, a patient is seen regardless of ability to pay. The ED is staffed by seven family practice physicians (5 are board certified) and two internal medicine physicians (1 is board certified). The only additional required training is advanced cardiac life support.

### Methods

Data were collected from all ED visits during a four-week period from June 8, 1992, to July 6, 1992. To compile data for this study, patient and physician questionnaires were developed, and criteria for an appropriate ED visit were adopted. The patient survey consisted of five questions, which included the patient's perception of the urgency of the visit (scaled from 1 to 10), the patient's perception of how soon the care was needed (minutes,

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hours, days), the reason(s) for the ED visit, and whether the ED or a physician was notified before the ED visit. The physician survey consisted of the following questions: the physician's perception of the appropriateness of the visit, the perceived urgency of the visit (scaled from 1 to 10), and the physician's perception of how soon the care was needed (minutes, hours, days).

The criteria used to determine appropriateness were based on the American College of Emergency Physicians guidelines reference and on a modification of a previous study by Buesching and co-workers.<sup>3</sup> A visit was considered appropriate if it fulfilled one of the following criteria: an acute condition—abdominal pain, fracture, headache present less than 48 hours—occurs suddenly; chest pain is the chief symptom; fever greater than 38.8°C is present in an adult or 39.4°C in a child and has been present less than 48 hours; the patient is being admitted or transferred to the hospital; the patient was brought by ambulance; the patient has a laceration; a chronic condition, such as chronic obstructive pulmonary disease, has acutely exacerbated; or the patient is referred to the ED by a physician.

Additional information was collected from the patients' ED admission sheets, including age, sex, race or ethnicity, town of residency, the primary payer (Medicare, Medicaid, private insurance, or self), time and day of visit (office hours were considered to be 9 AM to 5 PM), body temperature, chief complaint, diagnosis, admission to the hospital, attending physician, and whether the patient was brought in by ambulance.

Patients were asked by the ED personnel to complete the questionnaire before being evaluated by a physician. If a patient was unable to fill out the questionnaire, it was completed by the party who accompanied the patient. The physician questionnaire was completed by the attending physician after the visit. We evaluated each visit using the predetermined criteria.

Descriptive analyses were compiled using the SAS statistical package.  $\chi^2$  Tests were used to test the relationship between the appropriateness of a visit and other factors such as demographic characteristics. Logistic regression was used to estimate the effects of age, ethnicity, and primary payer on the occurrence of inappropriate visits. The largest sample sizes for these characteristics were for the categories 20 to 39 years old, Non-Hispanic White, and Insurance, which were chosen as the reference categories.\*

**Results**

There were 466 visits to the ED during the time period of the study. Of those 466 visits, 49 were excluded from further study because the patient came to the ED for the administration of medications (patients with standing orders), was sent by a physician for a procedure that could not be done in the office (casting or obtaining x-ray films), or left for a physician's office without being seen in the ED. Appropriateness data were collected for the re-

maining 417 visits. Patient questionnaires were complete for 326 (78%) and physician questionnaires for 390 (94%) of the 417 visits. For 316 (76%) of the visits, both patient and physician questionnaires were complete.

Characteristics and demographics of the ED population were compiled on all 466 patients. Male patients totaled 208 (44.7%), and female patients totaled 257 (55.3%). Of all visits, 25.4% were made by patients between the ages of 20 and 39 years. About a third of the visits (34.2%), however, were made by patients older than 40 years. The median age was 28 years. In all, 60% of the patients were non-Hispanic white, and 37.4% were Hispanic. The primary means of payment for 34.9% of the visits was private insurance. Medicaid and Medicare accounted for 28.0% and 19.8% of the primary payers, respectively. Visits were well distributed throughout the week, ranging from 11.6% on Wednesday to 17.2% on Sunday. A total of 186 of the visits (39.1%) occurred on the weekends (from 5 PM Friday to 8 AM Monday). The number of visits during office hours is less than that reported in other studies (Table 1).<sup>4,5</sup>

The demographic data of the general population of Roosevelt County and the ED population from the county were compared to identify which subpopulations used the ED most often (Figure 1).

According to the predetermined criteria, 285 visits (68.3%) were appropriate, with the remaining number (132, or 31.7%) considered inappropriate. Physicians, however, reported that 75.6% of the visits were appropriate with 24.4% being inappropriate (Figure 2). These differences are statistically significant ( $P < .0001$ ). Out of 394 visits, both physicians and the Buesching criteria classified the visit as appropriate 255 times (65%) and as inappropriate 77 times (20%), giving an overall rate of agreement between physicians and the Buesching criteria of almost 85%.

TABLE 1.—Characteristics of the Emergency Department Population (n = 466)

Characteristic	Patients,	
	No.*	%
Primary payer		
Self .....	80	17.2
Medicare .....	92	19.8
Medicaid .....	130	28.0
Insurance .....	162	34.9
Time of visit		
Office hours (9 AM-5 PM) .....	122	26.2
After hours .....	158	33.9
Weekend .....	186	39.9
Residence		
Portales, New Mexico .....	373	81.6
Roosevelt County (not including Portales) .....	27	5.9
Other New Mexico .....	36	7.9
Out-of-state .....	21	4.6

\*The total number of patients differs among categories because not all survey questions were answered.

\*Lori Lambert, Department of Family and Community Medicine, University of New Mexico School of Medicine, Albuquerque, provided statistical assistance.

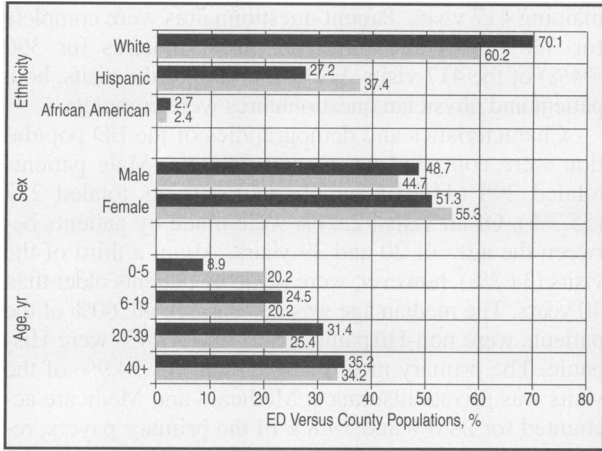


Figure 1.—The graph compares the general population of Roosevelt County (black bars) with the emergency department (ED) population (screened bars) by race, sex, and age.

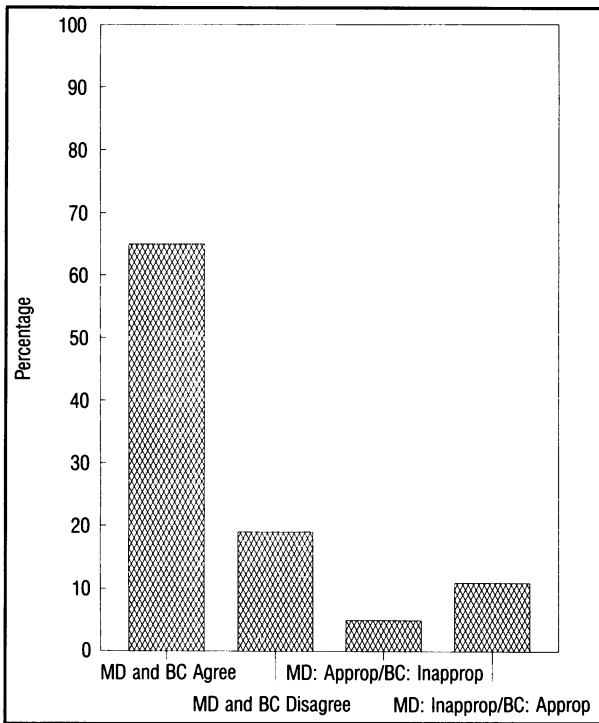


Figure 2.—Emergency department visits classified as appropriate (Approp) by physicians (MD) are compared with the appropriateness criteria of Buesching et al (BC) (K = .61).<sup>3</sup> Inapprop = inappropriate

Of the 132 visits determined by criteria to be inappropriate, the physicians thought that 43 (32.6%) were appropriate. Hereafter, if a visit was declared appropriate or inappropriate, its classification was determined by the criteria.

Table 2 shows the results of the multivariate logistic analysis of the effects of age, ethnicity, and primary payer on the occurrence of inappropriate visits.

Study variables were cross-tabulated with the appropriateness of the visit, and various subgroups were identi-

fied. As shown in Figures 3 and 4, there were significant differences in the percentages of inappropriate visits by age ( $P < .0001$ ), ethnicity ( $P < .002$ ), and primary payer ( $P < .0001$ ), with the highest percentages of inappropriate visits occurring for ages 0 to 5 (47.3%), Hispanics (41.6%), and Medicaid recipients (48.8%). When ethnicity and primary payer are taken into account, the odds ratios for inappropriate use by young children compared with those by adults ages 20 to 39 are not significantly different from 1. Statistically significant increases occur in the odds ratios for Hispanics and Medicaid recipients, however.

In general, patients and physicians have differing opinions of how soon medical treatment is required (Table 3). Almost 90% of the patients felt that their condition required treatment in less than 12 hours, whereas physicians thought that only 66.5% of the visits required treat-

TABLE 2.—Multivariate Analysis of Inappropriate Visits by Age, Ethnicity, and Primary Payer

Variable	Odds Ratio (95% confidence interval)*	P value
<b>Age, years</b>		
0-2	0.9 (0.4, 1.8)	.71
3-5	0.9 (0.4, 2.2)	.87
6-12	0.4 (0.2, 0.9)	.03
13-19	0.2 (0.1, 0.5)	.002
20-39	1.0	--
40-60	0.8 (0.4, 1.5)	.43
60+	0.2 (0.0, 0.5)	.002
<b>Ethnicity</b>		
Non-Hispanic white	1.0	--
Hispanic	1.9 (1.2, 3.0)	.008
African American	0.9 (0.2, 3.9)	.9
<b>Primary payer</b>		
Insurance	1.0	--
Self	0.8 (0.4, 1.7)	.62
Medicaid	2.2 (1.3, 4.0)	.005
Medicare	2.7 (0.9, 7.9)	.08

\*Reference categories are as follows: Age 20-39, Non-Hispanic White, and Primary Payer—Insurance.

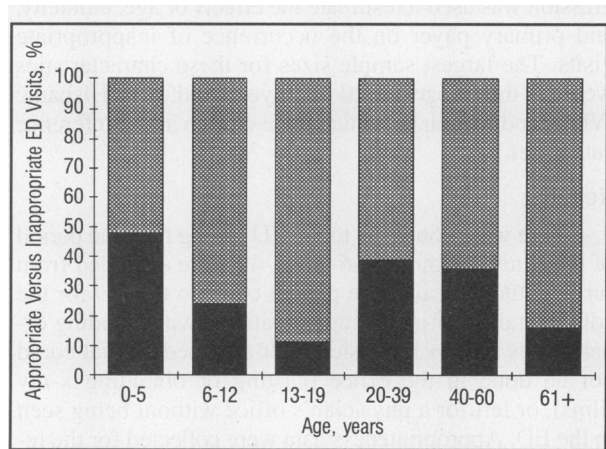


Figure 3.—The graphs depict the distribution of appropriate (screened) and inappropriate (black) emergency department (ED) visits by age.

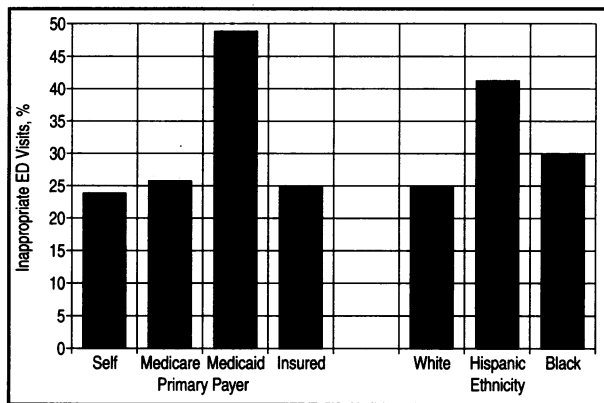


Figure 4.—The graphs depict the distribution of inappropriate emergency department (ED) visits by primary payer and ethnicity.

Perception	%
Physician = patient	24.9
Physician > patient	33.3
Physician < patient	41.7

ment in that time period (Table 4). When a physician's perception of the need for treatment was matched with a patient's, a slight positive correlation ( $r = .19, P < .0005$ ) was found. Patients and physicians agreed on the time frame for treatment in 26.6% of the cases. In 13.1%, the physician thought that care was needed sooner than the patient thought. In 184 visits (60.3%), the patient thought that treatment was required sooner than the physician did.

There was a significant correlation ( $r = .51, P < .0001$ ) between the urgency of the condition and the need for treatment as perceived by the patient. Likewise, a significant correlation ( $r = .72, P < .0001$ ) was found among the perceptions of the physicians. Patients and physicians both agreed that the more urgent the condition, the quicker treatment was required.

The top reasons a patient chose to come to the ED were as follows: the physician's office was closed (48%), the patient was able to get quick medical treatment (35.8%), the patient was too sick to wait for an appointment (31.3%), and the health problem had worsened (27.5%). Of the 326 visits with a completed patient questionnaire, only 7.5% of the patients said that they had no family physician.

**Discussion**

The definition of appropriate ED visit depends on whom you ask. As expected, patients and physicians have differing opinions. The medical literature fails to define appropriate use of the ED consistently. Thus, although numerous studies have attempted to quantitate the number of inappropriate visits,<sup>3,4,6-8</sup> the rate varies from 10.8% to 45% in urban settings.<sup>3,7</sup> The number of inappropriate ED visits in these studies was determined in several ways:

by physician opinion,<sup>6</sup> by medical criteria,<sup>7</sup> and by the use of criteria that took into account the patient's perception in the decision to initiate the visit.<sup>3,4</sup>

The issue of defining the appropriateness of ED use is beyond the scope of this study. Therefore, it is limited by the lack of a standard measure of appropriateness. Limitations of the modified Buesching criteria include their

Perceiver	Immediately (within minutes)		Urgently (1-2 hr)		Promptly (2-12 hr)		Delayed (> 12 hr)	
	No.	%	No.	%	No.	%	No.	%
Patient	129	38.8	112	33.7	56	16.9	35	10.5
Physician	48	12.2	93	23.7	121	30.8	131	33.3

failure to separate out children younger than 2 years with substantial fever. Most physicians would agree that a temperature of 38.5°C to 39.4°C in a child younger than 2 years is an appropriate reason to use an ED. Because modified Buesching criteria do not separate out these children, a temperature of below 39.4°C is considered an inappropriate use of the ED.

Nearly a third of the visits (32%) were found to be inappropriate as determined by criteria, and 24% were inappropriate based on physicians' opinion. This discrepancy may be due to the use of criteria specifying that if the duration of the chief symptom was greater than 48 hours, the visit was considered inappropriate. Numerous comments were made by the physicians that even though the visit was classified as appropriate at the time, it may have been inappropriate because of the duration of the symptoms.

The difference between the magnitude of correlation between physicians and patients may in part be explained by the method used to administer the survey. Patients completed the questionnaire before being seen by an attending physician. They may have thought survey answers had some bearing on being evaluated or receiving treatment. The physician questionnaire was completed after a patient was evaluated (retrospective). The fact that patients assessed the need to be seen before the medical evaluation whereas physicians reported appropriateness retrospectively makes the assessments more difficult to compare.

The application of criteria involves a substantial amount of judgment. To address this problem, only two of the authors were involved in applying the criteria. Also, the survey and study were discussed with the ED staff, both nurses and physicians, to try to standardize the administration of the questionnaires. This was easily accomplished because of the small size of the staff of the ED and the staff's cooperation.

Seasonal variation in ED use could be a bias of this study, but there was not substantial seasonal variation in the use of the ED. For 1992, the mean number of patients seen per day was 16.4, ranging from 14.7 in March to 18.1 in September. All other months ranged from 15.2 to 17.4 patients per day.

About 46% of the inappropriate visits were made by Medicaid recipients, who make up 15% of the general population of Roosevelt County. This number is less than that determined by Nelson and associates (64%).<sup>4</sup> Medicaid recipients constitute a large proportion of the inappropriate visits, which may be attributed to many factors. Because Medicaid is paying for the medical care, cost may not deter a visit to an emergency department.<sup>9</sup> Other possible explanations include that Medicaid recipients may perceive the ED as a good, quick place to receive medical treatment. Because emergency departments in rural areas may not be busy, the staff may be able to give them quick, friendly, and efficient care, even for a non-emergency. These reasons may also apply to many inappropriate visits by patients with other types of medical insurance coverage.<sup>10</sup>

The univariate analysis revealed high rates of inappropriate ED use in children aged 5 years and younger (33.3% of inappropriate visits). This age group accounts for 8.9% of the general population of Roosevelt County. Buesching and colleagues found that 21.4% of inappropriate visits were made by children in this group.<sup>3</sup> Patients at this age are susceptible to frequent infections that usually come on suddenly. A possible reason for this group's high rate of inappropriate visits may be that the parents are unsure what to do when their child becomes ill. Educating parents about daily care, such as quieting a crying child and managing a high temperature, may be beneficial in decreasing the number of inappropriate visits in this age group. Also, stressing to parents to phone the ED or a physician before making a visit could lower the rate of inappropriate visits.<sup>11</sup> Although this age group may have a higher rate of inappropriate ED visits, the multivariate analysis did not show an age of younger than 5 years as a significant factor when other factors were controlled for.

Identifying and characterizing the subgroups that frequently use the ED are important. By knowing which groups are more likely to have inappropriate visits, educational efforts can be directed more effectively. The financial solvency of a rural ED is an important factor in keeping the doors open for "true emergencies." The study did not analyze the possible effects of a reduction of inappropriate ED use. This type of analysis would be important to do before programs are created to reduce inappropriate ED use in a rural area.

Another subgroup identified in previous studies was those patients who did not have a personal physician. Even though only 7.5% of the patients in our study said they had no family physician, the low physician-to-person ratio may affect the ED use. Although there is only one nonfederal physician for every 3,400 persons in Roosevelt County,<sup>12</sup> the overall inappropriate use rate of 31.7% is similar to that in studies done in urban areas.

Finally, the study may be biased because of the missing data from questionnaires not completed by physicians or those not completed by patients. The demographic data available on these partial responses were not significantly different from those of patients with both the patient and physician questionnaires completed.

## Conclusion

To decrease the frequency of inappropriate attendance, educational efforts should be focused on the subgroups with the highest rates of inappropriate use. In this study, Medicaid recipients would be a place to start. These frequent users<sup>13</sup> are candidates for intensive patient education, behavioral modification, and strengthened support from the health care systems.

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