

Compliance With Emergency Department Referral: The Effect of Computerized Discharge Instructions

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Study objective: To examine the effect of computerized discharge instructions on emergency department patient referral recommendations.

Design: Prospective, descriptive analysis and clinical trial.

Setting: Emergency medicine residency-affiliated urban hospital with 568 beds and 29,000 annual visits.

Type of participants: One thousand ED patients discharged to an outpatient referral network during a six-week period.

Intervention: Mandatory referral was provided in written or computerized (Logicare Corp, Eau Claire, Wisconsin) format for each 500-patient group. Demographic data and compliance, measured as appointment completion within 30 days, were analyzed using χ^2 with Yates' correction, Fisher's exact, and odds ratio comparisons ($P < .05$, 95% confidence interval).

Measurements and main results: The institution of computerized discharge instructions resulted in increased overall patient compliance from 26.2% to 36.2% ($P < .0008$) with odds ratio of 1.59 (1.2 to 2.1). Subset analysis showed increased compliance in patients who were more than 40 years old (32.5% to 61.1%), were female (28.7% to 39.7%) with a private physician (36.4% to 53.9%), established hospital relationship (26.1% to 38.9%), had nonurgent complaints (26.5% to 36.2%), were specifically diagnosed with strain or contusion (17.0% to 36.8%), or were referred to obstetrics/gynecology clinic (13.2% to 48.6%) ($P < .001$).

Conclusion: Computerized discharge instructions were associated with improved compliance with ED referral recommendations, based on historic and contemporary controls.

[Vukmir RB, Kremen R, Ellis GL, DeHart DA, Plewa MC, Menegazzi J: Compliance with emergency department referral: The effect of computerized discharge instructions. *Ann Emerg Med* 1993;22:819-823.]

INTRODUCTION

The optimal emergency department patient encounter should include a medical referral source for follow-up care. Successful outpatient therapy is based on recognition of illness, a proper diagnosis, and compliance with the therapeutic plan.¹ Although encountered frequently, the issue of ED patient compliance has not been studied in a rigorous fashion. However, the largest study of general ED patients used the same model and showed a 27.4% overall compliance rate with referral recommendations.² Thus, the ED, a frequently used and effective health care modality, is beset by relatively poor patient compliance.

The significance of ED care is well documented. The national ED census has increased from 3,000 visits in 1944 to 45 million in 1965 and currently is estimated at 92 million yearly visits.^{3,4} The ED serves as a trauma treatment center, a substitute for a private physician, and "a family physician" for the urban poor.² The model is supported by rationale for ED use that includes accessibility in an emergency (26% to 35%) and the anticipated difficulties in reaching a private physician (38% to 48%).⁵ Perhaps the most significant issue in regard to compliance is the proportion of patients using the ED without a private physician, estimated at 40%.^{6,7}

This population consists of high-frequency users characterized as a lower-income, poorly educated, minority population residing in the inner city, without a private physician. They present with higher illness severity, with as many as 58% of urban poor hospitalized, and might well benefit from increased educational efforts to improve compliance.⁸ The goal of this study was the institution of a method, specifically, computerized discharge instructions (Logicare Corp, Eau Claire, Wisconsin), to improve patient compliance with ED referral recommendations.

MATERIALS AND METHODS

This was a prospective, case-controlled study. The population consisted of 500 equal control and intervention groups presenting consecutively to the ED during an established time interval, a 60-day period in January and February 1991, respectively. Historic control is provided by a 1,400-patient group prospectively collected during a 30-day period in 1989. Patients enrolled included those discharged with referral to an established follow-up network. The system used was a University of Pittsburgh Emergency Medicine Residency affiliate, the Western Pennsylvania Hospital, with 568 beds and 29,000 annual visits in an urban environment.

Discharged patients received mandatory written (control) or computerized (intervention) instructions for referral to private physicians or outpatient clinics reviewed before discharge. The written instructions were legible and included the name, location, and telephone number of the physician or clinic to which the patient was being referred. The computerized discharge instructions used are available commercially in English as "Checkout" (Logicare Corp). These instructions were generated by the physician at the time of discharge. The physician first entered the patient's name, which then appeared at the top of the discharge sheet. The next item on the discharge sheet indicated the name of the physician who rendered the ED care. The diagnosis was entered and appeared in bold type, followed by an explanation of the disease process of approximately 115 words in length. Medication, dosage regimen, and length of treatment then were entered, and an explanation including the indications and side effects of the medication or treatment modality of approximately 100 words in length could be added to the discharge sheet at the physician's discretion. The name, address, and telephone number of the physician or clinic with which the patient was to follow up were entered as well as a recommended date for follow-up. These instructions were written to be understood by a patient with a fifth- to sixth-grade education. Compliance was measured as completion of the designated referral appointment within a 30-day period. This information for staff physicians and clinics was assessed by internal registration record review by contacting each proposed referral (private physician or public clinic) source.

Data collection included patient demographics, specifically, age—pediatric (0 to 12 years), young adult (12 to 40 years), and older adult (more than 40 years)—sex; complaint categorization as urgent or routine; system familiarity—whether a new or old patient based on a one-year hospital association—method of payment indicating private or clinic referral; diagnosis determined by ICD-9-CM classification; and medical specialty referral.

Data were recorded as mean, range, and proportion of total patients. Group comparisons used χ^2 with Yates' correction for continuity, Fisher's exact, and odds ratio comparison test with $P < .05$ and a 95% confidence interval designating significance.

RESULTS

One thousand two hundred nineteen patients were encountered, with 18% admitted and 82% (1,000) discharged and assigned to the control (500) and inter-

vention (500) groups. The patients encountered had a median age of 36 years (range, 2 weeks to 91 years). The population was predominately young adult aged 12 to 40 years (56.1%), female (59.1%), clinic patients (55.8%) with an established hospital association (85.1%) and nonurgent complaints (93.8%), most commonly diagnosed as contusion or strain (27.7%), and referred to medical clinics (35.2%) (Tables 1 to 4).

The use of computerized discharge instructions was associated with an increase in overall patient compliance, with referral recommendation from 26.2% to 36.2% ($P < .0001$) and odds ratio of 1.59 (95% confidence interval, 1.2 to 2.1). Analysis of demographic correlates revealed increased compliance in older (32.5% to 61.1%) female (28.7% to 39.7%) patients with a private physician (36.4% to 53.9%), established hospital relationship (26.1% to 38.9%), and nonurgent complaints (26.5% to 36.2%) specifically diagnosed with strain or contusion (17.7% to 36.8%), or those referred to obstetrics/gynecology clinics (13.2% to 48.6%) ($P < .001$) (Tables 1 to 4).

DISCUSSION

In the present study, several aspects of the computerized instructions may have played a role in the improved compliance. The placement of the patient's name at the top of the discharge sheet may have "personalized" the instructions, making them seem customized to the patient and therefore more relevant. The entry of the physician's name may help to remove some of the anonymity from the episodic ED care in which some patients may leave without even noting the name of the physician who saw

them. This lack of established physician-patient relationship may be a factor in noncompliance with the physician's recommendations. The explanation of the disease process, based on the diagnosis entered, may help the patient to understand how the diagnosis was reached and increase their confidence that the diagnosis was appropriate. The explanation of treatment modality further helps the patient to understand the reason for the medication or treatment, the appropriate dosing schedule, and the duration of treatment. The name, address, and telephone number of the physician to whom the patient was referred are documented clearly. By making the discharge instructions more personal and informative so that the patient is more involved in the treatment plan, the patient may be more inclined to follow through with the regimen prescribed, including follow-up.

The most germane issue is whether compliance examined in a particular hospital may be extrapolated to another medical care facility. Simply stated, "There is no single model to describe the emergency room."⁹ A main distinction is between the urban facility serving the undereducated poor without other medical resources and the suburban facility used by the educated upper socioeconomic classes with family physicians.^{9,10} Most facilities, including our model, provide a mixture of these two patient populations, each with distinct reasons for noncompliance, but differ in their ratio.

The issue of compliance with medical regimens has been addressed for several specific concerns—psychiatric and medical disease, as well as medication compliance. Compliance with recommendations from a collected series of medical intervention regimens suggests a response of

Table 1.
Compliance

	Incidence	Total	Written	Computerized
Compliance		31.2%	26.2%	36.2%
$P < .0008$		312/1,000	131/500	181/500
Odds ratio 1.6 (1.2–2.1)				
Age (yr)				
0–12	16.2%	34.7%	35.7%	33.3%
	162/1,000	56/162	30/84	26/78
12–40	56.1%	14.3%	19.6%	9.5%
	561/1,000	80/561	52/265	28/296
Older than 40	27.7%	45.5%	32.5%	61.1%
$P < .0001$	277/1,000	126/277	49/151	77/126
Sex				
Female	59.1%	33.7%	28.7%	39.7%
$P < .000001$	591/1,000	199/591	79/289	120/302
Male	40.9%	27.6%	24.6%	20.8%
	409/1,000	113/409	52/211	61/198

Table 2.
Demographics

	Incidence	Total	Written	Computerized
Relationship				
Old	85.1%	32.5%	26.1%	38.9%
$P < .0000001$	851/1,000	277/851	110/422	167/429
New	14.9%	23.5%	26.9%	19.7%
	149/1,000	35/149	21/78	14/71
Urgency				
Nonurgent	93.8%	31.3%	26.5%	36.2%
$P < .000001$	938/1,000	294/938	125/471	169/467
Urgent	6.2%	29.0%	20.7%	36.4%
	62/1,000	18/62	6/29	12/33
Payment				
Clinic	55.8%	20.3%	17.8%	22.6%
	558/1,000	113/558	49/275	64/283
Private	44.2%	40.5%	36.4%	53.9%
$P < .000001$	442/1,000	199/442	82/225	117/217

48.2% (range, 4% to 92%).^{11,12} The findings in this study, a mean compliance with follow-up recommendations of 31% (baseline rate of 26%, which improved to 36%), correlates well with these studies. The compliance rate in the baseline portion (written instructions) of this study was virtually identical to that found in an earlier prospective study at the same institution, which found a compliance rate of follow-up of 27.4%.² Thus, both historic (1990, 1,400 patients) and contemporary (1991, 500 patients) controls found an identical compliance rate for written instructions, demonstrating reproducibility of the model.

This study prospectively evaluated a large patient group (1,000) in controlled fashion. Prior evaluations focused on smaller groups (50 to 100) and special interest populations (psychiatric or administrative) in retrospective questionnaire fashion.¹³⁻¹⁵ We used institutional assessment of patient appointment completion, avoiding the necessity of active patient input.

Limitations of study design include a mandatory referral strategy not allowing for disease improvement, where a follow-up visit may not be necessary. Also, the lack of insight into patient rationale for noncompliance might be improved by patient interview. A framework for successful compliance should be established before discussion of noncompliance. Patients are likely to comply with medical

Table 3.
Diagnosis

	Incidence	Total	Written	Computerized
Contusion <i>P</i> < .01	13.0% 130/1,000	27.7% 36/130	17.7% 11/62	36.8% 25/68
Bronchitis	5.7% 57/1,000	28.1% 16/57	22.2% 6/23	29.4% 10/34
Otitis media	4.8% 48/1,000	25.0% 12/48	21.7% 5/23	28.0% 7/25
Viral syndrome	3.9% 39/1,000	30.8% 12/39	23.8% 5/21	38.9% 7/18
Laceration	3.7% 37/1,000	24.3% 9/37	26.1% 6/23	21.4% 3/14
Pharyngitis	3.7% 37/1,000	16.3% 6/37	19.1% 4/21	13.3% 2/16
Fracture	3.6% 36/1,000	19.4% 7/36	23.8% 5/21	13.3% 2/15
Urinary tract infection	3.2% 32/1,000	21.9% 7/32	23.8% 4/16	13.3% 3/16
Gastroenteritis	3.0% 30/1,000	20.0% 6/30	23.1% 3/13	17.6% 3/17
Sinusitis	2.2% 22/1,000	27.7% 5/22	40.0% 4/10	8.3% 1/12

directives if health motivation, perceived severity, benefits of professional intervention, barriers to action taken, and knowledge of medical condition or treatment regimens exist.¹⁶ Prior studies have cited lack of understanding (31% to 66%) of expectations or the mechanism for successful referral as the main factor contributing to noncompliance and patient dissatisfaction.^{15,17} Practical issues such as availability of child care and transportation and the cost of services and medications also have been implicated.¹³

Several interventional modes to increase patient compliance have been suggested. The most basic but crucial intervention is the provision of mandatory written discharge instructions. Discharge instructions should convey specific information concerning diagnosis, therapy, and follow-up source in a readable format. Successful communication is significant because most patients have a sixth- to eighth-grade reading competency, with most patient education material requiring high school graduate level capability.^{18,19}

Table 4.
Specialty

	Incidence	Total	Written	Computerized
Medical	35.2% 192/547	7.8% 15/192	5.6% 5/89	9.7% 10/103
Pediatrics <i>P</i> < .04 Odds ratio 0.5 (0.2-10)	26.5% 145/547	33.8% 49/145	41.8% 33/79	24.2% 16/66
Orthopedics	14.3% 78/547	14.1% 11/78	9.2% 4/42	19.4% 7/36
Obstetrics/gynecology <i>P</i> < .002 Odds ratio 6.3 (1.7-23.1)	13.7% 75/547	30.7% 23/75	13.2% 5/38	48.6% 18/37
Surgery	8.3% 45/547	17.8% 8/45	9.5% 2/21	25.0% 6/24
Burn	1.1% 6/547	50% 3/6	0 0	50% 3/6
ED	0 0	0 0	0 0	0 0
Urology	0.1% 2/547	50% 1/2	0 0	50% 1/2
Ear, nose, throat	0.1% 2/547	50% 1/2	0 0	50% 1/2
Ophthalmology	0.1% 2/547	50% 1/2	0 0	50% 1/2
Dental	0 0	0 0	0 0	0 0
Dermatology	0 0	0 0	0 0	0 0
Suture	0 0	0 0	0 0	0 0

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These interventional modes have provided some documented efficacy. A behavioral modification model incorporating education, motivation techniques, and telephone contact resulted in improvement in appointment completion (24% to 68%).¹⁵ The most significant factor may be telephone contact, with 95% of patients stating such intervention was helpful.²⁰ Last, compliance also improved if contact was made with the patient's private physician (59% to 79%) or if the appointment was made at time of discharge from the ED (28% to 70%).^{21,22}

CONCLUSION

The institution of computerized discharge instructions was associated with significantly improved patient compliance with follow-up appointments. This may be due to more successful communication of physicians' expectations, as well as streamlining the task of accessing the medical care system.

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