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

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 566 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 χ² 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). Subsequent analysis showed increased compliance in patients who were more than 40 years of age (32.5% to 61.1%), were female (26.7% to 39.7%) with a private physician (36.4% to 53.9%), had established hospital relationships (26.1% to 39.9%), 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 48.8%) (P < .001).

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

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. 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. 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. The ED serves as a trauma treatment center, a substitute for a private physician, and a "family physician" for the urban poor. The model is supported by its popularity for ED use that includes accessibility in an emergency (26% to 35%) and the anticipated difficulties in reaching a private physician (38% to 48%). Perhaps the most significant issue in regard to compliance is the proportion of patients using the ED without a private physician, estimated at 40%. 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. 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 1989, respectively. Historic control is provided by a 1,000-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 368 beds and 20,000 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 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 ascertained by internal registration record review by contacting each proposed referral (private physicians 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 $x^2$ 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 ninety patients were encountered, with 18% admitted and 82% (1,000) discharged and assigned to the control (500 who inter-
vitation (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 (36.1%), 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 recommendations 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 obstetric/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.” A main distinction 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. 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>
<thead>
<tr>
<th>Table 1. Compliance</th>
<th>Incidence</th>
<th>Total</th>
<th>Written</th>
<th>Computerized</th>
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<tr>
<td>Compliance</td>
<td></td>
<td>31.2%</td>
<td>26.7%</td>
<td>36.7%</td>
</tr>
<tr>
<td>P &lt; .00001</td>
<td></td>
<td>20111/000</td>
<td>131/1000</td>
<td>18/1000</td>
</tr>
<tr>
<td>Age (y)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0-12</td>
<td>16.7%</td>
<td>34.7%</td>
<td>35.7%</td>
<td>33.3%</td>
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<tr>
<td>13-40</td>
<td>16.1/000</td>
<td>56/1000</td>
<td>46/1000</td>
<td>26/1000</td>
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<tr>
<td>12-40</td>
<td>56.5%</td>
<td>14.2%</td>
<td>19.8%</td>
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<td>0-12</td>
<td>37.7%</td>
<td>45.6%</td>
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<td>Older (age &gt; 60)</td>
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<td>49/101</td>
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<td>Sex</td>
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<td></td>
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<tr>
<td>Female</td>
<td>58.1%</td>
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<td>5911/000</td>
<td>195/001</td>
<td>78/288</td>
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<td>Male</td>
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<td>71.3%</td>
<td>61.3%</td>
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<tr>
<td>409/101/000</td>
<td>113/490</td>
<td>52/211</td>
<td>81/181</td>
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<th>Table 2. Demographics</th>
<th>Incidence</th>
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<th>Written</th>
<th>Computerized</th>
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<tr>
<td>Relationship</td>
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<td></td>
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<tr>
<td>Child</td>
<td>85.1%</td>
<td>32.5%</td>
<td>26.1%</td>
<td>38.9%</td>
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<tr>
<td>P &lt; .000001</td>
<td>27/101/000</td>
<td>112/42</td>
<td>10/42</td>
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<tr>
<td>New</td>
<td>14.9%</td>
<td>23.5%</td>
<td>25.8%</td>
<td>15.7%</td>
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<tr>
<td>140/002</td>
<td>22/690</td>
<td>21/78</td>
<td>14/78</td>
<td></td>
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<tr>
<td>Urgency</td>
<td>93.6%</td>
<td>51.3%</td>
<td>26.5%</td>
<td>30.7%</td>
</tr>
<tr>
<td>Nontarget</td>
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<td>236/48</td>
<td>125/47</td>
<td>150/467</td>
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<tr>
<td>Urgent</td>
<td>6.4%</td>
<td>48.7%</td>
<td>23.5%</td>
<td>39.3%</td>
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<td>64/248</td>
<td>64/248</td>
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<tr>
<td>Payment</td>
<td>55.9%</td>
<td>20.3%</td>
<td>17.8%</td>
<td>22.8%</td>
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<tr>
<td>Union</td>
<td>59/91/000</td>
<td>113/598</td>
<td>48/375</td>
<td>64/380</td>
</tr>
<tr>
<td>Private</td>
<td>44.2%</td>
<td>40.5%</td>
<td>32.2%</td>
<td>37.2%</td>
</tr>
<tr>
<td>P &lt; .000001</td>
<td>447/1001</td>
<td>185/84</td>
<td>82/225</td>
<td>117/217</td>
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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 (like the 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%.12 Thus, both histoc.
(1991, 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 connected fashion. Prior evaluations focused on smaller groups (50 to 100) and special interest populations (psychiatric or administrative) in retrospective questionnaire fashion.13,14 We used institutional assessment of patient appointment completion, avoiding the necessity of active patient input.
Limitations of study design include a mandatory referral route for disease-free follow-up, where a follow-up visit was not 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. Diagnoses
Incidence Total Written Computerized
Coronary 13.9% 27.7% 17.7% 35.8%
CVD 120/1001 261/1002 11/92 25/96
Brachial 5.7% 28.1% 22.2% 29.4%
BPD 5/1001 5/1002 1/102 1/104
Ovarian 4.9% 25.0% 21.7% 28.0%
Viral infection 3.9% 36.9% 23.8% 38.9%
Lettre 100/1001 21/1002 11/102 21/1102
Lactation 3/1003 21/1004 21/102 21/102
Pharyngitis 3/1005 11/1006 1/102 2/102
Sepsis 2/1007 21/1008 21/102 21/102
Liver disease 2/1009 21/1010 21/102 21/102

directives of health motivation, perceived severity, benefits of professional intervention, barriers to action taken, and knowledge of medical nutrition or treatment regimens exist.10 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.17,18 Practical issues such as availability of child care and transportation and the cost of services and medications also have been implicated.19
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 schedule in a readable format. Successful communication is significant because most patients have a sixth- to eight-grade reading competency, with most patients education material requiring high school graduate level capability.15-18

Table 4. Specialty
Incidence Total Written Computerized
Medical 33.2% 7.8% 5.6% 8.7%
Cardiologic 120/1001 5/1002 3/102 10/103
Pediatrics 21/1001 45/1002 15/102 30/102
Orthopedics 14.3% 14.1% 12.2% 13.9%
Geriatrics-gastroenterology 7/1001 11/1002 4/102 6/102
Surgery 8.3% 17.9% 9.0% 25.9%
Endoscopy 4/1001 6/1002 2/102 4/102
Radiology 0.1% 50.0% 0.0% 0.0%
Neurology 2/1004 1/102 1/102 0.0%
Ophthalmology 3/1005 1/102 0.0% 0.0%
Dermatology 0.0% 0.0% 0.0% 0.0%

These interventional modes have provided some documented behavioral modification model incorporating education, motivation techniques, and telephone contact resulted in improvement in appointment completion (24% to 60%).10 The most significant factor may be telephone contact, with 96% of patients stating such intervention was helpful.20 Lani, 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 (26% to 70%).21

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.

REFERENCES

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Several intervention 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 schedule in a readable format. Successful communication is significant because most patients have a sixth- to eighth-grade reading competency, with most patients education material requiring high school graduate level capability.

Table 6

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Incidence</th>
<th>Total</th>
<th>Written</th>
<th>Computerized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical</td>
<td>31.1%</td>
<td>7.8%</td>
<td>19.6%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>112,547</td>
<td>15,102</td>
<td>593</td>
<td>10103</td>
</tr>
<tr>
<td>Obstetrics</td>
<td>26,135</td>
<td>2416</td>
<td>4154</td>
<td>1686</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>74,457</td>
<td>11,740</td>
<td>442</td>
<td>398</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>74,500</td>
<td>2375</td>
<td>5788</td>
<td>1036</td>
</tr>
<tr>
<td>Surgery</td>
<td>83.1</td>
<td>17.9%</td>
<td>9.5%</td>
<td>25.9%</td>
</tr>
<tr>
<td>Burn</td>
<td>1.1</td>
<td>0.2%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>74,500</td>
<td>2375</td>
<td>5788</td>
<td>1036</td>
</tr>
</tbody>
</table>
| Urology| 0.1%| 50%| 0| 0%
| Far, north, throat| 2.44| 1/2| 1/2| 1/2|
| Orthopedics| 0.1%| 50%| 0| 0%
| Urology| 0.1%| 50%| 0| 0%
| Dermatology| 2.54| 1/2| 1/2| 1/2|
| Surgery| 0| 0| 0| 0|

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.

REFERENCES


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