# Patient Compliance with Recommendations for Analgesic Therapy After a Visit to the Emergency Department

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**Abstract**

*Objectives:* To investigate patient compliance with analgesic therapy after discharge from the emergency department (ED) and the factors associated with it.
*Methods:* The computerized discharge records of the ED of a tertiary medical center were reviewed daily over a two-week period for all patients aged 18 years or more who presented with minor to moderate trauma. The patients were surveyed by a structured telephone interview within 4-7 days of discharge regarding compliance with written prescriptions or oral recommendations for analgesic therapy and the reasons for noncompliance, if applicable.
*Results:* Of the 394 eligible patients, 151 (38%) completed the survey. Thirty (20%) received a written prescription for an analgesic drug, of whom 21 (70%) took them as prescribed, and 68 (45%) received a verbal recommendation, of whom 40 (59%) complied; 27 patients (18%) took an analgesic drug on their own counsel. The likelihood of receiving a prescription was significantly higher for patients of Middle Eastern origin ($p<0.05$; OR 0.2; 95% CI 0.1 to 0.6) and lower education ($p<0.05$; OR 0.13; 95% CI 0.03 to 0.49). Half the prescriptions were for selective COX-2 inhibitors. Noncompliance was associated with current intake of many chronic medications ($P<0.05$). Patients who did not comply reported having the drug or a similar one at home or feeling no need for it.
*Conclusion:* The rate of compliance with analgesic treatment after an ED visit is lower than reported for other prescription drugs. Improved public education combined with clearly written prescriptions will help increase the effectiveness of ED care.

**MeSH Words**: Analgesia, pain, compliance, trauma, emergency department, prospective study

## Introduction

Despite the importance of patient compliance with the recommended analgesic therapy following emergency department (ED) care, little is known about the factors affecting it or the interventions that could potentially improve it.

Studies of primarily adult patients reported that 78-88% filled prescriptions (for all kinds of medications) following ED visits [1,2]. Significant independent factors associated with not doing so were lack of medical insurance and dissatisfaction with the discharge instructions [2]. In children, rates were higher (93%) with noncompliance due mainly to parental dissatisfaction with the physician's explanation of the medical problem and with the instructions for treatment [1].

Pain is the most frequent symptom in the ED, but it often goes unrecognized by physicians or improperly treated [3]. Recently, McIntosh and Leffler [4] reported an 83% compliance rate with

filling prescriptions for analgesics after an ED visit, but they did not search for correlations with age, sex, or injury type. The aim of the present prospective study was to determine the level of compliance with analgesic treatment in patients who present to the ED with minor trauma and to identify factors associated with it.

## Methods

*Patients*

The study was conducted prospectively in the ED of a tertiary, university-affiliated medical center in central Israel with an annual census of 125,000 adult patient visits. The sample included all consecutive patients aged 18 years or more who were discharged from the ED during the first two weeks of April 2002 with an ICD-9 diagnosis indicating a minor to moderate traumatic injury (of the hand, arm, calf or ankle), as follows: fracture, sprain, dislocation, burn, contusion, open wound. Eligible patients were identified daily by one of the authors (H.N.) by review of the computerized ED discharge records. People who lived in nursing homes, who were not fluent in Hebrew (when called), or had dementia or suspected dementia (as recorded in the ED chart or inferred by the researcher upon initiation of the interview) were excluded. The Institutional Review Board approved the study protocol and waived the need for patient informed consent.

*Methods*

Previous studies have shown that telephone surveys can accurately reveal the pattern of compliance with analgesic prescriptions and uncover the factors influencing it [4]. For the present study, we used a structured, table-based questionnaire (see Appendix) with numerical scales assigned to value items and numerical signs assigned to multiple-choice items. Patients were asked if they had received a written prescription or oral recommendation for analgesics from the ED or other physician visited during follow-up; if they had filled the prescription or, if not, why; if they had taken the prescribed/recommended medication as directed or, if not, why; or if they had taken pain killers at their own initiative (in the absence of a written prescription or oral recommendation). All patients were interviewed by telephone 4-7 days after discharge from the ED. A minimum of 3 attempts were made to contact each patient, at least one during business hours and one in the evening. Interviewees were not told of the purpose of the research.

The outcome measures of the study were compliance with filling the prescription and taking the recommended medication and reasons for noncompliance.

*Statistics*

The association of compliance with background and clinical parameters was tested by univariate logistic regression and expressed as odds ratio (OR) and 95% confidence intervals (CI). Comparisons between groups of patients (received/did not receive prescription; filled/did not fill prescription; took/did not take prescribed medication) by demographic parameters, clinical parameters, and outcome was performed using two-sample t-test, Wilcoxon nonparametric test, or chi-square/Fisher exact test, as appropriate. The level of statistical significance was set at 0.05. Data were managed and analyzed with SPSS for Windows, version 11.0.

## Results

Of the 394 patients found eligible for the study, 151 (38.3%) completed the survey. Their background characteristics are shown in Table 1. Thirty (20%) received a prescription for analgesics from the ED physician (25 patients, 83%) or their family practitioner (5 patients, 17%), of whom 21 (70%) filled it (95% CI 53 to 87). Sixty-eight (45%) received an oral recommendation to take an analgesic from the ED physician (54 patients, 78%) or from another medical practitioner (general practitioner, army doctor, orthopedist, sports medicine physician; 14 patients, 22%), of whom 40 (59%) took the medication as advised (95% CI 47 to 71). Twenty-seven patients (18%) took analgesic drugs on their own counsel, without a written prescription or oral recommendation (Fig. 1).

The most frequent analgesics prescribed were etodolac (30%) and rofecoxib (20%), both selective cyclooxygenase (COX-2) inhibitors, and ibuprofen (20%), a nonselective nonsteroidal drug. There was no significant difference in the characteristics of the patients by type of drug prescribed.

*Table 1: Univariate correlates of receiving a prescription for an analgesic in the ED in patients with mild-moderate traumatic injuries*

| Characteristic | Received prescription (n=30)* | Did not receive prescription (n=121)* | P ($\chi^2$ or Wilcoxon) | OR (95%CI) |
|---|---|---|---|---|
| Age (years) | | | .30 | |
| ≤25 | 12 (21) | 46 (79) | | 1 |
| 26-45 | 2 (7) | 25 (93) | | 3.3 (0.7 to 15.8) |
| 46-65 | 9 (24) | 28 (76) | | 0.8 (0.3 to 2.2) |
| >65 | 7 (24) | 22 (76) | | 0.8 (0.2 to 2.4) |
| Sex | | | .41 | |
| Male | 14 (17) | 68 (83) | | 1 |
| Female | 16 (23) | 53 (77) | | 0.6 (0.3 to 1.5) |
| Injury type | | | .18 | |
| Contusion | 13 (30) | 30 (70) | | 1 |
| Fracture | 1 (4.5) | 21 (95.5) | | 9.1 (1.1 to 74.6) |
| Open wound | 4 (12.5) | 28 (875.) | | 3.0 (0.9 to 10.4) |
| Dislocation | 1 (25) | 3 (75) | | 1.3 (0.1 to 13.7) |
| Sprain | 5 (20) | 20 (80) | | 1.7 (0.5 to 5.8) |
| Bruising | 5 (24) | 16 (76) | | 1.4 (0.4 to 4.6) |
| Burn | 1 (25) | 3 (75) | | 1.3 (0.1 to 13.7) |
| Marital status | | | 0.35 | |
| Single | 11 (15) | 62 (85) | | 1 |
| Married | 15 (24) | 47 (76) | | 0.6 (0.2 to 1.3) |
| Divorced | 3 (33) | 6 (67) | | 0.4 (0.1 to 1.6) |
| Widowed | 1 (14) | 6 (86) | | 1.1 (0.1 to 9.7) |
| Live alone | | | 1 | |
| No | 24 (20) | 96 (80) | | 1 |
| Yes | 6 (19) | 25 (81) | | 1.0 (0.4 to 2.8) |

| | | | | |
|---|---|---|---|---|
| Origin | | | .02 | |
| Israel | 13 (14) | 79 (86) | | 1 |
| Europe/USA | 4 (16) | 21 (84) | | 0.9 (0.3 to 2.9) |
| Asia/Africa | 9 (45) | 11 (55) | | 0.2 (0.1 to 0.6) |
| USSR | 2 (20) | 8 (80) | | 0.7 (0.1 to 3.4) |
| Middle East (except Israel) | 2 (50) | 2 (50) | | 0.17 (0.1 to 1.3) |
| Education | | | .01 | |
| 0-8 years | 9 (43) | 12 (57) | | 0.13 (0.03 to 0.49) |
| 9-`12 years | 17 (20) | 67 (80) | | 0.38 (0.12 to 1.19) |
| 12+ years | 4 (9) | 42 (91) | | 1 |
| Chronic medications | | | 0.08 | |
| No | 16 (16) | 86 (84) | | 1 |
| Yes | 14 (29) | 35 (71) | | 0.5 (0.2 to 1.0) |
| Number of chronic medications | | | .74 | |
| 1 | 5 (31) | 11 (69) | | 1 |
| 2 | 3 (27) | 8 (73) | | 1.2 (0.2 to 6.6) |
| 3 | 2 (50) | 2 (50) | | 0.5 (0.1 to 4.2) |
| 4+ | 4 (22) | 14 (78) | | 1.6 (0.3 to 7.4) |
| Number of pills daily | | | 1 | |
| 1-2 | 6 (29) | 15 (71) | | 1 |
| 3-5 | 4 (29) | 10 (71) | | 1 (0.2 to 4.5) |
| 6+ | 4 (29) | 10 (71) | | 1 (0.2 to 4.5) |
| Explanation in the ED | | | .01 | |
| Yes | 23 (29) | 57 (71) | | 1 |
| No | 7 (10) | 64 (90) | | 3.3 (1.3 to 8.3) |
| Satisfaction | | | 1 | |
| Yes | 21 (30) | 50 (70) | | 1 |
| No | 2 (22) | 7 (78) | | 1.5 (0.3 to 7.7) |

** Values are n (%)*

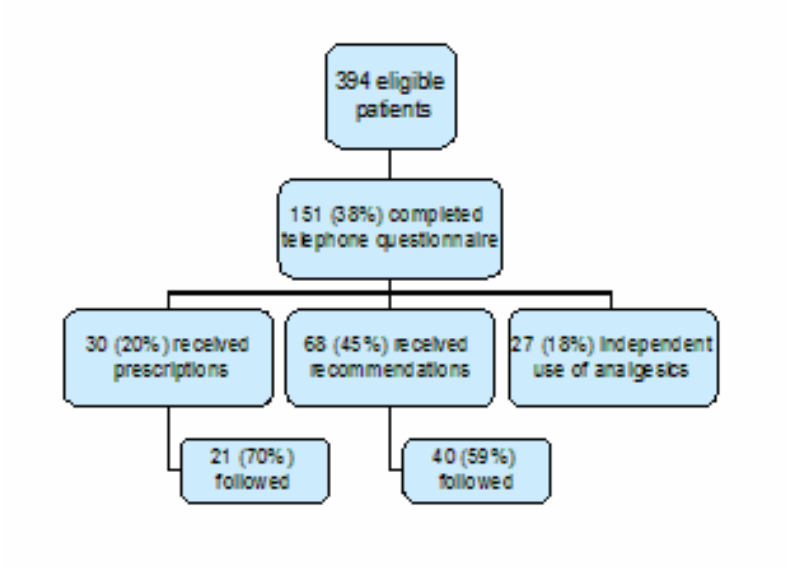


*Figure 1: Compliance with filling of the prescriptions for analgesics*

*Table 2: Univariate correlates of filling a prescription for an alagesic in the ED in patients with mild-moderate traumatic injuries*

| Characteristic | Filled prescription (n=21) | Did not fill prescription (n=9) | P ($\chi^2$ or Wilcoxon) | OR (95%CI) |
|---|---|---|---|---|
| Age (years) | | | .83 | |
| ≤25 | 9 (75) | 3 (25) | | 1 |
| 26-45 | 2 (100) | 0 (0) | | 0.0 |
| 46-65 | 6 (67) | 3 (33) | | 1.5 (0.2 to 10.1) |
| >65 | 4 (57) | 3 (43) | | 2.3 (0.3 to 16.4) |
| Sex | | | .12 | |
| Male | 12 (86) | 2 (14) | | 1 |
| Female | 9 (56) | 7 (44) | | 4.6 (0. 8 to 28) |

| | | | | |
|---|---|---|---|---|
| Injury type | | | .18 | |
| Contusion | 10(77) | 3(23) | | 1 |
| Fracture | 1(100) | 0(0) | | 0 |
| Open wound | 2(50) | 1(50) | | 3.3 (0.3 to 34.8) |
| Dislocation | 1(100) | 0(0) | | 0 |
| Sprain | 2(40) | 3(60) | | 5 (0.5 to 45.4) |
| Bruising | 5(100) | 0(0) | | 0 |
| Burn | 0(0) | 1(100) | | |
| Marital status | | | 1 | |
| Single | 8 (73) | 3 (27) | | 1 |
| Married | 10 (67) | 5 (33) | | 1.3 (0.2 to 7.4) |
| Divorced | 2 (67) | 1 (33) | | 1.3 (0.1 to 20.7) |
| Widowed | 1 (100) | 0 (0) | | |
| Live alone | | | .64 | |
| No | 16 (67) | 8 (33) | | 1 |
| Yes | 5 (83) | 1 (17) | | 0.4 (0 to 4.0) |
| Origin | | | .29 | |
| Israel | 10 (77) | 3 (23) | | 1 |
| Europe/USA | 1 (25) | 3 (75) | | 10 (0.7 to 135.3) |
| Asia/Africa | 6 (67) | 3 (33) | | 1.7 (0.3 to 11.1) |
| USSR | 2 (100) | 0(0) | | 0 |
| Middle East | 2 (100) | 0 (0) | | 0 |
| Education | | | .64 | |
| Elementary/none | 6 (67) | 3 (33) | | 2 (0.18 to 22.1) |
| High school | 13 (76.5) | 4 (23.5) | | 3.25 (0.34 to 31.1) |
| Academic | 2 (50) | 2 (50) | | 1 |

| | | | | |
|---|---|---|---|---|
| Chronic medications | | | 1 | |
| No | 11 (69) | 5 (31) | | 1 |
| Yes | 10 (71) | 4 (29) | | 0.9 (0.2 to 4.2) |
| Number of chronic medications | | | .001 | |
| 1 | 5 (100) | 0 (0) | | |
| 2 | 3 (100) | 0 (0) | | |
| 3 | 2 (100) | 0 (0) | | |
| 4+ | 0 (0) | 4 (100) | | |
| Number of pills | | | .05 | |
| 1-2 | 6 (100) | 0 (0) | | 1 |
| 3-5 | 3 (75) | 1 (25) | | |
| 6+ | 1 (25) | 3 (75) | | 81 |
| Explanation in the ED | | | 1 | |
| Yes | 16 (70) | 7 (30) | | 1 |
| No | 5 (71) | 2 (29) | | 0.9 (0.1 to 5.9) |
| Pain intensity (score 1-10) | 6.2±3 | 8.3±1.3 | .26 | |
| Pain duration (days) | 4.8±1.6 | 4.5±0.6 | .73 | |
| Satisfaction | | | 1 | |
| Yes | 14 (67) | 7 (33) | | 1 |
| No | 2 (100) | 0 (0) | | 0 |

* Values are n (%) or mean ± SD

On univariate analysis (Table 2), compared to the patients who were not prescribed analgesics, the patients who received prescriptions from their ED or another physician were significantly more likely to be of Middle Eastern origin ($p<0.05$;OR 0.2, 95% CI 0.1 to 0.6) and to be less educated ($p<0.05$; OR 0.13;,95% CI 0.03 to 0.49). The reasons given for not filling prescriptions (9/30 patients, 30%) were as follows: "had the drug at home" (n = 3), "don't like to take drugs" (n = 1), "can deal with the pain without analgesics" (n = 1), "no time to buy the drug" (n = 1), "used another drug at home" (n=1), and "other" (n=2). The more types of chronic medications the patient was taking, the less likely he/she was to fill the ED prescription for an analgesic drug ($p<0.05$). The rate of filling a prescription also decreased with an increase in the number of pills the patient was taking regularly each day ($p<0.05$; OR 81).

Most of the patients who took the prescribed analgesic adhered to the proper dosage (13/21, 64%). Of the remainder, 28% took a lower dose and 8% took the medication according to pain intensity. The mean duration of treatment was 4.2 ±1.8 days.

Of the 68 patients who received only an oral recommendation, 40 (59%) took the analgesics as directed (95%CI 47 to 71). The mean duration of treatment in this subgroup was 3.7 ±1.7 days.

The 27 patients who took an analgesic on their own counsel showed no difference from the

other subgroups in any of the background characteristics. Their mean duration of treatment was 2.7±1.5 days.

**Discussion**

Patient compliance with prescribed medications is essential for a successful therapeutic outcome. In patients with chronic medical conditions, such as diabetes mellitus and hypertension, estimated rates of compliance with analgesic therapy range widely, from 7% to 85%, with an average of 66% [5]. One study from the United States in patients with cancer reported a lower-than-average compliance rate of 55% for round-the-clock analgesics [5]. Another study from Denmark in elderly patients found that analgesics were among the drugs most often involved in deviations from instructions for usage [6]. By contrast, for other types of drugs, relatively higher compliance rates of 78-88% have been documented in studies of mainly adults [1,2], and 93% in children [1]. Our search of the literature yielded only one previous study that investigated compliance specifically with analgesic therapy after ED discharge. McIntosh and Leffler [4] interviewed a total of 144 patients by telephone several days after they presented to the ED for common orthopedic complaints. Of the 88 who were prescribed analgesics, 73 (83%) filled their prescriptions. Correlations for compliance were not checked.

Our objective was to evaluate compliance with analgesic therapy in adults after an ED visit for minor to moderate trauma, and to identify the factors affecting noncompliance. The 70% compliance rate in the present series is lower than reported for nonanalgesic medications [1,2], including those for chronic conditions. This difference might be explained by the patients' possible consideration of analgesic drugs as nonessential to healing. This assumption is supported by the reasons offered by the patients in our study for not filling prescriptions: "don't like to take drugs", "can deal with the pain without analgesics", "no time to buy the drug", "used another drug at home". Another factor accounting for the lower rate may be the notorious clinical difficulty of predicting the duration and severity of pain in the individual patient after a single, brief encounter in the ED. Pain serves as a very clear message that something is wrong, and patients tend to use this personal feedback mechanism to judge for themselves when to discontinue analgesic therapy. Thus, instead of "compliance", perhaps we might better approach this issue in terms of "informed self-medication." After ED physicians fulfill their duty of prescribing an analgesic drug, verbally or in writing, according to their "best guess", it becomes the patients' responsibility to apply these recommendations to best manage their subjective pain following discharge.

In our study, a significant independent correlate of not filling prescriptions was the daily use of many regular medications, both in type and in number. The main reason cited by this subgroup was the presence of a supply of analgesic medications at home. Although this aspect was not tested, we suspect that people who take many medications are not keen to add yet another one, especially if they do no consider it essential, for reasons of inconvenience, cost, and fear of adverse reactions or drug interactions. Further studies are needed to examine this question.

Previous studies found other significant independent correlates of failure to fill prescriptions for nonanalgesics. In the survey of Thomas et al. [2], one of the main reasons given by patients was lack of medical insurance. This, however, is not a problem in Israel which has mandatory national health coverage. Other reasons were dissatisfaction with the discharge instructions and, in children, with the physician's explanation of the medical problem [1,2]. Other authors noted that failure to fill prescriptions was correlated with older age of the child, African-American origin, and rural residence [7]. For patients under chronic care, significant independent correlates of not filling prescriptions were intake of more than 3 drugs per day, prescriptions from more than one doctor, dementia (in the elderly) [6], and drug administration many times during the day (3 or 4 times as opposed to 1 or 2; in young people) [8]. Our study adds to these findings, showing that taking many medications also predicts noncompliance with post-ED analgesic therapy.

The likelihood of receiving a prescription for analgesics in the present study was higher for patients of Middle Eastern origin and fewer years of education. These findings may be explained by differences in pain expression among people of different ethnicities or education or

differences in the perception of their pain by the physician. Accordingly, others reported differences in pain assessment by origin of the patient and the caretaker, as well as by patient age, sex, and cognitive level. Todd et al. [3], in a study from Los Angeles, reported that fewer analgesics were prescribed to Hispanic than to Caucasian patients in the ED. Jaurez et al. [9], in a study of 17 Hispanic cancer patients, found that culture, family beliefs, and religion contributed to the expression of pain and its treatment.

Half the analgesic drugs prescribed to our study patients were selective COX-2 inhibitors. These agents cause less gastrointestinal hemorrhage than nonselective inhibitors, and they do not impair platelet function [3, 10]; however, they are more expensive. The ED protocol in effect during the study period at our center was to prescribe COX-2 inhibitors to people older than 65 years who were at risk of gastrointestinal bleeding or who took warfarin. Yet, according to our data, there were no differences in their prescription rate by patient age or medical background. The failure to adhere to accepted criteria and cost-effectiveness considerations in the ED is not uncommon, as exemplified by the rofecoxib affair [11].

This study was limited by the use of patient self-reports. However, the subjects' unawareness of the purpose of the survey limited the risk of a systematic error. In addition, we excluded people who lived in nursing homes, were not fluent in the national language, or who had dementia. Patients with these characteristics are often treated by caretakers who ensure their compliance with therapy, so their inclusion may have skewed the results.

In summary, we found that written prescriptions for analgesia were offered to only 20% of the patients who presented to the ED with a mild to moderate traumatic injury. The rate of compliance with filling these prescriptions was 70%, lower than the general compliance rate reported in the literature. We suggest that educating the public and encouraging physicians to offer comprehensive explanations with explicit and clear written prescriptions for analgesic medication will improve ED care.

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**Contribution of Authors**: Hadas Newman conducted the study, performed the data analysis, and cooperated in writing the paper; Pinchas Halpern initiated the study, planned the protocol, supervised the clinical work and data analysis, and cooperated in writing the paper.

**Acknowledgement:** The authors thank Esther Eshkol for her editorial assistance

**Competing Interests:** None declared.

**Funding:** None declared.

This manuscript has been peer reviewed.

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**Appendix: TELEPHONE QUESTIONNAIRE**

*Demographics*

1) Age
2) Sex
3) Type of injury: Contusion, Fracture, Open wound, Dislocation, Sprain, Bruising, Burn
4) Marital status: Divorced, Married, Widow/er, Single
5) Do you live alone? Yes/No
6) Origin: Israel, Europe/USA, Asia/Africa, USSR, Middle East (other than Israel)
7) Education: 0-8 years, 9-12 years, >12 years
8) Do you take medications chronically? Yes/No

If yes,

9) Number of types of medications
10) Number of pills daily

*Explanation in the ED*

11) Did you receive an explanation from the ED doctor regarding home treatment with analgesics? Yes/No

If yes,

12) Were you satisfied with the explanantion?

*Receipt of a prescription/verbal recommendation or self- treatment*

13) Did you receive a prescription for analgesics? Yes/No

If yes,

14) From whom did you receive it? ED physician/Other physician

If you did not receive a written prescription,

15) Did you receive a verbal recommendation for analgesics? Yes/No

If yes,

16) From whom did you receive it? ED physician/Other physician

If you did not receive a written prescription or verbal recommendations,

17) Did you take an analgesic on your own counsel? Yes/No

*Patients who were prescribed an analgesic*

18) What type of analgesic were you prescribed?
19) Did you fill the prescription? Yes/No

If you filled the prescription,

20) Did you take the exact dosage as directed? Yes/No
21) For how long did you take the analgesic?
22) What was the pain intensity when you left the ED, on a scale of 1-10?
23) How long did the pain last?
24) Why did you stop taking the analgesic?

If you did not fill the prescription,

Why not?

*Patients who received a verbal recommendation for analgesics*

25) What type of analgesic were you recommended?
26) Did you take the analgesic?
27) If only a general recommendation was given, what type of analgesic did you take?

If you took the analgesic,

Did you take the exact recommended dosage? Yes/No

For how long did you take the analgesic?
What was the pain intensity when you left the ED, on a scale of 1-10?
How long did the pain last?
Why did you stop taking the analgesic?

If you did not take the analgesic,
Why not?

*People who took analgesics on their own counsel*

28) What type of analgesic did you take?
29) For how long did you take the analgesic?
30) What was the pain intensity when you left the ED, on a scale of 1-10?
31) How long did the pain last?
32) Why did you stop taking the analgesic?