



RESEARCH ARTICLE

DOES ARRIVAL TIME MATTER FOR EMERGENCY PATIENTS WITH NON-TRAUMATIC
ABDOMINAL PAIN: A PROSPECTIVE STUDY

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ABSTRACT

Background: About 5-10% of patients reporting to the emergency department present with abdominal pain. Some of these patients are discharged without further treatment, while others are admitted to the ward. We carried out this prospective study to test whether the arrival time affects the management plan.

Patients and methods: Patients with non-traumatic abdominal pain who visited the emergency department of Shandong University Qilu Hospital between February and May 2016 were evaluated. Demographic data, symptoms, concurrent symptoms, symptom duration, arrival time, and preliminary diagnoses were recorded. Observation endpoints were: discharge without further treatment, admission into wards, death, emergency surgery, admission into the intensive care unit (ICU). Linear regression was performed to evaluate the factors affecting these endpoints.

Results: A total of 167 patients were included (73 males and 94 females), with an average age of 45.5 years (range: 14-96 years). Two factors affecting the management plan were preliminary diagnosis and admission month. Patients diagnosed with diseases of the gastrointestinal tract were more likely to be discharged than those diagnosed with hepatic bile and pancreatic diseases ($P = 0.024$). Patients visiting the emergency department in May were more likely to be discharged ($P = 0.003$). Age, gender, symptom duration, concurrent symptoms, and arrival time were not correlated with the management plans.

Conclusions: This study failed to find a correlation between arrival time and patients' management plans. Besides the comprehensible diagnosis, the admission month was also shown to affect the management plan.

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INTRODUCTION

Acute abdominal pain is one of the most common presenting complaints in the emergency department (ED) (Gayer 2008). Most of the patients with non-traumatic abdominal pain are discharged without specific treatment, while others are admitted into inpatient wards for further treatment. The management plan is mainly based on the physician's clinical evaluation, rather than the advanced technology and sophisticated diagnostics (Simmen, Decurtins *et al.*, 1991). It is reasonable to expect that patients with initial diagnoses of hepato-biliary-pancreatic (HBP) diseases are more likely to be admitted than those with an initial diagnosis of gastrointestinal tract (GIT) diseases, although evidence is lacking. Some physicians consider "arrival time and diagnosis" as a possible predictor for the outcomes of patients with abdominal pain,

based on a speculation that patients with HBP-derived abdominal pain are more critical and progress more rapidly than those with GIT-derived abdominal pain. Consequently, HBP patients may progress more rapidly and arrive earlier than GIT patients, and are more likely to be admitted to the wards. Effects from other factors, such as age, gender, symptom duration, concurrent symptoms were not reported. This study aimed to test whether the arrival time, among other factors, determined the patients' management plan after leaving the ED.

MATERIALS AND METHODS

From February to May 2016, we collected data about patients with a main complaint of non-traumatic abdominal pain in the Internal Medicine Clinic of the Shandong University Qilu Hospital, ED. Patients with indications for emergency surgery upon arrival, acute gastrointestinal bleeding, evidence of acute coronary heart disease-related abdominal pain, and conditions needing ICU admission were excluded. Patients' age, gender,

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symptom duration, arrival time, concurrent symptoms and conditions, preliminary diagnoses, and end of emergency stay (EES) were recorded. Observation endpoints were: discharge without further treatment, admission into wards, death, emergency surgery, and left against medical advice (LAMA). This study was reviewed and approved by the Qilu hospital Ethics Committee. Written informed consent was obtained from all patients.

Statistics

Statistical analyses were performed using SPSS 13.0 (SPSS Inc., Chicago, IL, USA). Both continuous and discrete variables were expressed as numbers, and percentages or frequencies. Differences in the parameters between different variables were performed by linear regression and cross tabs. P value < 0.05 was regarded as statistically significant.

RESULTS

Patients

The demographics of the 167 patients (average age 45.5 years, including 73 males and 94 females) presenting with abdominal pain to the ED of Qilu Hospital, Shandong University, between February and May 2016, were collected from the medical records. Among all the patients, 98 were diagnosed with gastrointestinal (GI) diseases, 59 with HBP diseases, 3 with systemic diseases presenting with abdominal pain, and 7 patients with unknown causes. Eighty-eight patients out of the 167 were discharged from the ED without further treatment. Fifteen patients were transferred to the hepatology, surgery and hematology wards. Seven patients left the hospital against medical advice. The remaining 57 patients were admitted to the gastrointestinal ward. Abdominal pain was the chief complaint of all patients. Most of them also complained about weight loss, loss of appetite, nausea and vomiting. The data are shown in Table 1.

diagnosed with GI diseases were more likely to be discharged than those diagnosed with HBP diseases (77/98 vs. 6/59, respectively, P = 0.024).

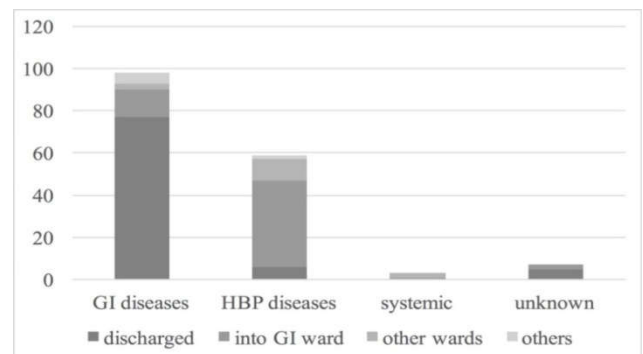


Figure 1. Diagnoses and end of emergency stay (EES). Patients diagnosed with gastrointestinal (GI) diseases are more likely to be discharged than those with hepato-biliary-pancreatic (HBP) diseases

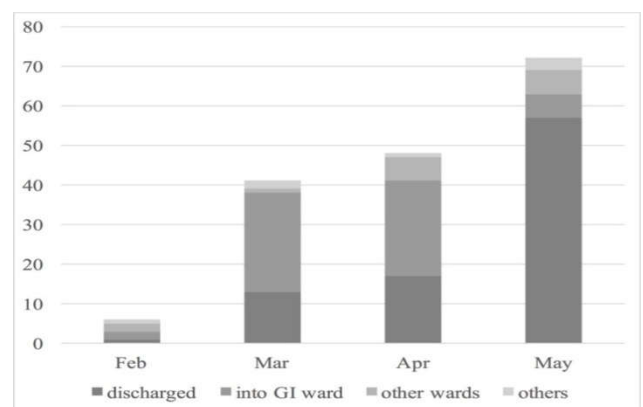


Figure 2. Admission month and end of emergency stay (EES). Patients visiting in the most crowded month of May were more likely to be discharged

Table 1. Clinical characteristics of the patients

Number of patients		167
Ages [average (range)]		(14-96)
Gender (male: female)		(73:94)
Diagnosis	Gastrointestinal	98
	Hbp	59
	Systemic	3
	Unknown	7
End of emergency	Discharged	88
	Gi ward	57
	Other wards	15
	Others	7

Table 2. Linear regression of factors regarding emergency stay

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
(Constant)	2.054	.426		4.825	.000
Age	.004	.003	.085	1.037	.302
Gender	-.074	.132	-.044	-.563	.574
Duration of symptom	2.20E-005	.000	.010	.120	.905
Time of Arrival	-.002	.009	-.014	-.180	.858
Concurrent symptoms	.042	.094	.038	.442	.659
Diagnosis categories	.202	.088	.184	2.281	.024*
Month	-.245	.080	-.267	-3.070	.003*

Factors determining patients' EES

Linear regression showed that the preliminary diagnosis was the main factor determining the patients' EES. Patients

However, the arrival time was not shown to be a determining factor (P = 0.858), along with other factors such as age, gender, symptom duration, or concurrent symptoms. It is worth noting that the admission month was a significant factor influencing

the patients' EES. Patients visiting the ED in May were most likely to be discharged ($P = 0.003$). The results of linear regression are shown in Table 2. Correlations between diagnosis, admission months, and EES are shown in Figures 1 and 2.

DISCUSSION

Abdominal pain is one of the commonly presenting complaints in ER. In this study, we mainly focused on the factors influencing the patient's admission to the ward. On analyzing our data, we found that EES was dependent on 2 variables i.e. preliminary diagnosis and admission month, while the remaining variables did not show any significant effect. Some physicians regard the arrival time of the patients as an important factor in deciding their further management i.e. patients reporting from morning till evening are more likely to be suffering from pancreatitis than those who are reporting from late night till early morning with gastritis, though evidence supporting this hypothesis is lacking. To the best of our knowledge, our study is the first to test this hypothesis, and our results failed to support it. Preliminary diagnosis is, with no doubt, the main factor determining the patients' management plan after leaving the ED. Patients diagnosed with HBP diseases need more diet restriction, intravenous antibiotics and monitoring, which usually need admission into GI or other wards. Diagnosis with GI diseases, such as acute gastroenteritis, is more likely to be self-limiting, and hence patients are discharged without further treatment. Although some physicians speculate that patients with HBP diseases might arrive at the ED earlier during night than those with GI diseases, the results of our study showed no correlation between arrival time and diagnosis or arrival time and EES. These results suggest against the strategy of less staffing during the after-midnight shift. Interestingly, admission month was an independent factor determining patients' EES in our study. We found a strong increase in the number of discharged patients from ED during the month of May. One explanation for this trend is the overcrowding, which was encountered during this month of the study period. Several studies indicate that overcrowding in the ED significantly delays patients' CT scanning (Mills, Baumann *et al.*, 2010) and analgesia administration (Mills, Shofer *et al.*, 2009), and also has an impact on patients' admission into inpatient wards (Blom, Landin-Olsson *et al.*, 2015). There are some limitations of this study: First, the observation period was short.

A longer duration, covering at least one year, should be conducted to verify the primary speculation. Second, the sample size was too small to evaluate mortality, which is the most important outcome for treatment and strategy making. A larger-scale multi-center study would be needed to aid designing the policy for night emergency staff responsible for patients with non-traumatic abdominal pain.

Conclusion

Patients with non-traumatic abdominal pain are more likely to be admitted into inpatient wards if they are diagnosed with HBP diseases than with GI diseases. The admission month also affected the patients' EES; those visiting the emergency in the most crowded months are more likely to be discharged. This study failed to support a correlation between arrival time and EES.

Conflict of Interests

The authors declare no conflict of interest regarding this study.

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