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Original Article

Characteristics and outcomes of patients with emergency department revisits within 72 hours and subsequent admission to the intensive care unit

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ABSTRACT

Objective: This study aimed to investigate the characteristics and outcomes of patients with emergency department (ED) revisits within 72 hours and subsequent admission to the intensive care unit (ICU).

Materials and Methods: The medical records of all adult patients revisiting the ED of a single tertiary referral medical center with ICU admissions between January 2012 and September 2014 were reviewed in terms of patient characteristics, clinical manifestations, diagnoses, triage according to the Taiwan Triage and Acuity Scale, causes of revisits, and mortality.

Results: The majority of the 51 patients reviewed were male (64.7%). Their mean age was 62.9 ± 14.9 years. Most patients visited the ED during the evening shift (51%) and were categorized into triage Level III (76.5%) during their first ED visit. The causes of revisits were doctor-related (21/51, 41.1%), illness-related (18/51, 35.3%), and patient-related (12/51, 23.5%). Disease categories included the neurological (23.5%), digestive (23.5%), and cardiovascular systems (21.6%). Abdominal pain and vertigo/dizziness were the two most common initial manifestations. The mortality rate was 27.5%. Malignancy and hepatic diseases were the two most common underlying medical conditions for nonsurvivors. In addition, patients initially presenting to the ED with lower triage scores (III & IV) had a higher mortality rate than those with higher scores (I & II).

Conclusion: Most of the patients who revisited the ED within 72 hours and were subsequently admitted to the ICU visited the ED during the evening shift and were categorized into triage Level III on their first visit. The most common chief complaint at the first visit was abdominal pain. The most common cause of revisits with ICU admission was doctor-related, while the most common underlying disease was hypertension. Significantly higher mortality was observed after ED revisits in patients with lower triage scores with underlying malignancy and liver cirrhosis.

1. Introduction

The occurrence of unscheduled return visits to the emergency department (ED) is a widely known indicator of the quality of patient care, guiding the implementation of appropriate improvement strategies [1–7]. It is defined as a return ED visit within 72 hours at which the patient presents with the same chief complaint [5–9]. Previous studies have demonstrated a rate of ED revisits of approximately 3%, ranging from 1.9% to 5.47% [1–7,10]. These patients were considered to have a higher rate of morbidity and mortality than other ED patients, and analysis of the causes could help to establish guidelines to reinforce the quality of health care [2,7].

Although unscheduled return visits to the ED are regarded as an important quality indicator of patient safety, as well as the system responsible for the delivery of emergency care, the reasons for return visits to the ED are complicated and multifactorial. The type of disease, local culture, and psychosocial, medical, and health system

Conflicts of interest: none.

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issues are all involved. However, one retrospective cross-sectional study demonstrated the utilization of fewer resources, without higher hospital admission or mortality rates for patients with ED revisits within 72 hours, compared with first-time ED visitors. The authors suggested a more refined and reliable indicator, such as ED revisit-admission within 72 hours, be used to assess health care quality and patient safety [11]. A few studies have evaluated the causes of revisits, the characteristics of patients who return to the ED within 72 hours, and prognostic predictors of unplanned hospital admission within 72 hours after ED discharge in various time frames and hospital settings [5–7,12–14]. These studies demonstrated that 22% to 48% of patients with return visits were admitted to ordinary wards and 4.2% to 6.1% to the intensive care unit (ICU) [6–8,13,15,16].

Critical diseases may be overlooked because of initial atypical or trivial presentations, which may result in diagnostic or treatment delay or early release of patients from the ED, resulting in ED revisits shortly after discharge [17–20]. A revisit with ICU admission is a serious adverse event in ED management, therefore it is important to understand and analyze the underlying causes in order to improve patient safety [21,22]. Although previous studies have shown that the overall mortality rate ranged from 8% to 19% in ICUs in the United States [23–25] and was approximately 20.2% in Taiwan [26], the mortality rates of patients with ED visits and ICU admission have not been extensively investigated. To our knowledge, there have been few studies of unplanned revisits and subsequent ICU admission [10,27]. One retrospective single hospital study evaluated the characteristics and prognostic predictors of the patient subpopulation and showed a strong association with medical errors [27]. To further explore the precise characteristics of adult revisit patients with ICU admission, we conducted a study primarily aimed at identifying the causes of revisits, clinical manifestations, and outcomes of adult patients with ICU admission within 72 hours after ED discharge. The secondary aim was to evaluate the in-hospital mortality rate in this patient subpopulation.

2. Materials and methods

2.1. Study design

This study was conducted at a 1251-bed, tertiary referral hospital in southern Taiwan which receives approximately 66,000 emergency visits per year. From January 1, 2012 to September 30, 2014, the electronic medical records of all adult patients who revisited the ED within 72 hours after initial discharge with subsequent admission to the ICU were extracted from our ED administrative database and retrospectively reviewed in terms of patient information, arrival and discharge time, underlying diseases, triage level according to the Taiwan Triage and Acuity Scale, and disease category. The causes and timing of initial ED visits and revisits, characteristics of presentations, and patient outcomes including their in-hospital mortality rate were also analyzed and compared. The Institutional Review Board of our institution approved the protocol of the present study. The study was a retrospective review of the hospital database and all patients were unidentifiable before the study, therefore the Institutional Review Board waived the need for informed consent.

2.2. Study population

All adult patients aged 18 years or older fitting the criteria of ED revisit within 72 hours with subsequent admission to the ICU were included in the current study. Pediatric patients were excluded from the present study because the causes and characteristics of their return visits to the ED are different to those of adult and elderly patients [28,29]. In addition, patients who revisited the ED within 72 hours of initial discharge for unrelated medical problems were also excluded (Fig. 1).

During the study period, a total of 155,347 adult patients visited the ED, of whom 6114 (4%) made a return visit within 72 hours (Fig. 1). Among these 6114 patients, 1856 (30%) were admitted to the hospital; 1791 (29%) to the wards and 65 (1%) to the ICU. The mean age of all 1856 patients was 55 ± 24.1 years and 59% were male. Of the 65 patients subsequently admitted to the ICU, 51 fulfilled the enrollment criteria and were recruited for the present study. The remaining 14 made unrelated revisits and were excluded. The mean age of these 51 patients was 62.9 ± 14.9 years (range, 26–89 years) and 64.7% were male.

2.3. Definitions

Patients were categorized in terms of disease severity according to the Taiwan Triage and Acuity Scale which was modified from the Canadian Triage and Acuity Scale and officially adopted by the Taiwanese emergency health care system in 2010: Level I, resuscitation; Level II, emergency; Level III, urgent; Level IV, less urgent; and Level V, nonurgent. Additionally, the present study classified the nature of the return visits in accordance with the causes based on the method proposed in a previous study by Pierce et al [2] with minor modifications. Briefly, return visits were divided into three groups: doctor-related (i.e., diagnostic errors and inadequate treatment); illness-related (i.e., disease progression, recurrent disease process, and expected medical complications); and patient-related (i.e., discharge against medical advice and noncompliance). Two senior emergency physicians then determined the classification for each return visit. If the classifications of the two physicians were inconsistent, the final decision was made by a third expert. If more than one cause was identified, the doctor-related cause took priority over all other causes and the illness-related cause took priority over the patient-related cause.

Patients were divided into survivors and nonsurvivors for further comparisons.

2.4. Statistical analysis

All analyses were performed using SPSS (Version 15.0, Chicago, IL, USA). A two-sided $p < 0.05$ was considered to be significant. Differences between survivors and nonsurvivors with ED return visits and admission to the ICU were compared using Fisher's exact test for categorical variables.

3. Results

3.1. Characteristics of patients revisiting the ED with subsequent ICU admission

Most of the 51 patients visited the ED during the evening shift (51%) and were categorized into triage Level III (76.5%) in their first ED visit. The causes of revisits with ICU admission were judged to be doctor-related (21/51, 41.1%), illness-related (18/51, 35.3%), or patient-related (12/51, 23.5%), while the common underlying diseases were hypertension (39.2%), diabetes mellitus (27.5%), and malignancy (27.5%) (Table 1). The neurological (23.5%), digestive (23.5%), and cardiovascular systems (21.6%) were most commonly involved.

The most common chief complaints of the 39 patients admitted for doctor-related or illness-related factors were abdominal pain (13/39, 33.3%) and vertigo/dizziness (4/39, 10.3%) with the

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