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ORIGINAL ARTICLE

# Impact on patient outcome of emergency department length of stay prior to ICU admission

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**KEYWORDS**
Time-dependent complication;
Emergency department;
Critical care

**Abstract**
*Objective:* The favorable evolution of critically ill patients is often dependent on time-sensitive care intervention. The timing of transfer to the intensive care unit (ICU) therefore may be an important determinant of outcomes in critically ill patients. The aim of this study was to analyze the impact upon patient outcome of the length of stay in the Emergency Care Department.
*Design:* A single-center ambispective cohort study was carried out.
*Setting:* A general ICU and Emergency Care Department (ED) of a single University Hospital.
*Patients:* We included 269 patients consecutively transferred to the ICU from the ED over an 18-month period.
*Interventions:* Patients were first grouped into different cohorts based on ED length of stay (LOS), and were then divided into two groups: (a) ED LOS $\leq$5 h and (b) ED LOS >5 h.
*Variables:* Demographic, diagnostic, length of stay and mortality data were compared among the groups.
*Results:* Median ED LOS was 277 min (IQR 129–622). Patients who developed ICU complications had a longer ED LOS compared to those who did not (349 min vs. 209 min, $p < 0.01$). A total of 129 patients (48%) had ED LOS >5 h. The odds ratio of dying for patients with ED LOS >5 h was 2.5 (95% CI 1.3–4.7). Age and sepsis diagnosis were the risk factors associated to prolongation of ED length of stay.

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*Conclusions:* A prolonged ED stay prior to ICU admission is related to the development of time-dependent complications and increased mortality. These findings suggest possible benefit from earlier ICU transfer and the prompt initiation of organ support.


**PALABRAS CLAVE**
Complicación dependiente del tiempo;
Servicio de urgencias;
Cuidados intensivos

**Impacto pronóstico de la duración de la estancia en el Servicio de Urgencias antes del ingreso en la UCI**

**Resumen**
*Objetivo:* La evolución de los pacientes críticos se relaciona con intervenciones que dependen del tiempo. Por tanto, el momento de traslado de los pacientes graves a la UCI puede relacionarse con el pronóstico. El objetivo de este estudio fue analizar el impacto de la duración del ingreso en Urgencias sobre el pronóstico de los pacientes.
*Diseño:* Estudio de cohortes ambispectivo de centro único.
*Ámbito:* UCI polivalente y Servicio de Urgencias de un Hospital Universitario.
*Pacientes:* Un total de 269 pacientes ingresados en la UCI consecutivamente desde urgencias durante 18 meses.
*Intervenciones:* Se agrupó a los pacientes en cohortes según la duración del ingreso en urgencias. Después se dividieron en 2 grupos: a) estancia en urgencias $\leq$ 5 h, y b) estancia en urgencias > 5 h.
*Variables:* Demográficas, diagnóstico, estancia, mortalidad.
*Resultados:* Mediana de estancia en urgencias de 277 min (RIC 129-622). Los pacientes que desarrollaron complicaciones en la UCI tuvieron mayor estancia en Urgencias que aquellos sin complicaciones (349 vs. 209 min, p < 0,01). Un total de 129 pacientes (48%) tuvieron un ingreso en urgencias > 5 h. La *odds ratio* para el fallecimiento hospitalario de los pacientes con un ingreso en urgencias > 5 h fue de 2,5 (IC del 95%, 1,3 a 4,7). La edad y la sepsis fueron los factores de riesgo asociados a la prolongación del ingreso en urgencias.
*Conclusiones:* Una estancia prolongada urgencias antes del ingreso en la UCI se relaciona con el desarrollo de complicaciones que dependen del tiempo y con la mortalidad. Estos hallazgos sugieren un beneficio del ingreso precoz en la UCI y del inicio de soporte orgánico sin retraso.


## Introduction

The time lapse between the onset of organ dysfunction and the initiation of appropriate treatment may play a decisive role in outcome for critically-ill patients. In fact, patients who have already developed multiple organ dysfunction syndrome (MODS) predict a very poor outcome,[1] and a subsequent intensive care unit (ICU) admission may well prove futile. Successful evolution of these patients often depends on time-sensitive care interventions capable of repairing the damaged organs. Among such interventions are aggressive resuscitation after major trauma, thrombolytic agent therapy in stroke patients, early rapid fluid resuscitation and appropriate antibiotics in septic shock, or artery revascularization in myocardial infarction.[2–6] Thus the timing of transfer to the ICU to receive life-sustaining therapies may be an important determinant of outcome for critically-ill patients admitted to the emergency department (ED). Delayed ICU admissions have been associated with higher mortality.[7–9] Delays of four or more hours in ICU transfers following physiological deterioration have been associated with a 3.5 times higher mortality rate.[10]

Few studies have investigated the impact on critically-ill patients of ED length of stay prior to ICU admission.[11] However, solid data exist concerning already severely-ill patients having to wait in the emergency department for ICU bed availability.[7,12,13] These studies confirm that waiting time is associated with poorer outcome, although there is still little data to support the use of any particular time frame as an indicator of quality of care. Outside of the ICU and postoperative care areas, critical care is more frequently delivered in the emergency department than in any other area in the hospital. Hence the increasing focus on ''critical care without walls'',[14,15] whereby critically-ill patients are increasingly being cared for in the emergency department.[16]

For emergency department patients, the timing of transfer to the ICU may be an important determinant of outcomes. Therefore, the purposes of this study were to identify factors likely to increase emergency department length of stay, and analyze the relationship between ED length of stay and the clinical course of disease in patients subsequently admitted to the ICU.