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Rebounds after discharge from the emergency department for community-acquired pneumonia: focus on the usefulness of severity scoring systems

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Summary. *Background:* Community-acquired pneumonia (CAP) is common cause of hospital admission and leading cause of morbidity and mortality. Severity scoring systems are used to predict risk profile, outcome and mortality, and to help decisions about management strategies. *Aim of the work and Methods:* To critically analyze pneumonia "rebound" cases, once discharged from the emergency department (ED) and afterwards admitted. We conducted an observational clinical study in the acute setting of a university teaching hospital, prospectively analyzing, in a 1 year period, demographic, medical, clinical and laboratory data, and the outcome. *Results:* 249 patients were discharged home with diagnosis of CAP; 80 cases (32.1%) resulted in the high-intermediate risk class according to CURB-65 or CRB-65. Twelve patients (4.8%) presented to the ED twice and were then admitted. At their first visit 5 were in the high-intermediate risk group; just 4 of them were in the non-low risk group at the time of their admission. The rebound cohort showed some peculiar abnormalities in laboratory parameters (coagulation and renal function) and severe chest X-rays characteristics. None died in 30 days. *Conclusions:* The power of CURB-65 to correctly predict mortality for CAP patients discharged home from the ED is not confirmed by our results; careful clinical judgement seems to be irreplaceable in the management process. Many patients with a high-intermediate risk according to CURB-65 can be safely treated as outpatients, according to adequate welfare conditions; we identified a subgroup of cases that should worth a special attention and, therefore, a brief observation period in the ED before the final decision to safely discharge or admit. (www.actabiomedica.it)

Key words: community-acquired pneumonia, severity scoring systems, rebounds, CURB-65 score, CRB-65 score, emergency department, clinical judgment, risk stratification, admit versus discharge, continuity of care

List of abbreviations

ABG:	Arterial Blood Gas
ATS:	American Thoracic Society
BP:	Blood Pressure (mm Hg)
bpm:	breaths per minute
BTS:	British Thoracic Society
CAP:	Community-acquired Pneumonia
CRB-65:	Confusion, Respiratory Rate, Blood Pressure, Age
CURB-65:	Confusion, Urea, Respiratory Rate, Blood Pressure, Age
DBP:	Diastolic Blood Pressure (mm Hg)
ED:	Emergency Department

EP:	Emergency Physician
GCS:	Glasgow Coma Scale
GP:	General Practitioner
HCAP:	Health Care Acquired Pneumonia
HMDU:	High Medical - Dependency Unit
HR:	Heart Rate (pulses per minute)
ICU:	Intensive Care Unit
IDSA:	Infectious Diseases Society of America
MBP:	Mean Blood Pressure (mm Hg)
OOH:	Out-Of Hospital
ppm:	pulses per minute
PSI:	Pneumonia Severity Index
RR:	Respiratory Rate (breaths per minute)
SBP:	Systolic Blood Pressure (mm Hg)
SpO_2:	Peripheral Oxygen blood Saturation measured using a pulse oximeter
SSS:	Severity Scoring System
SSU:	Short Stay Unit
VAP:	Ventilation Associated Pneumonia

Introduction and aim of the study

Community - acquired pneumonia (CAP) is the most frequent severe infection in medical practice, a common cause of hospital admission, and a leading cause of increased morbidity and mortality (1-5).

The right management of CAP in the emergency department (ED) is essential to ensure optimal management for each patient, and also for the proper use of hospital resources. Despite a significant body of relevant literature, several doubts remain, namely related to the optimal definition of clinical severity, most useful criteria for appropriate patient allocation, the value of immediate microbiological diagnosis, and proper criteria for treatment choice (5-11).

In the everyday real-life of bedside practice, emergency physicians (EPs) face the crucial challenge to assess the optimal initial management and adequate monitoring of patients with CAP, to identify those at high or intermediate or low risk, to pick out eligible patients for a safe and effective out-of hospital (OOH) treatment in the community, ensuring a positive impact on quality of health care, quality of life, and individual satisfaction. To get to this point it is necessary to carefully evaluate clinical factors, but also welfare conditions and subjective aspects that are neither predictable "a priori", nor easy to identify in the pressing setting of the ED. Mortality, hospital readmissions and dissatisfaction with care are the recognized indicators for failure in this multifaceted decision process.

Severity scoring systems (SSSs) are widely used to predict risk profile, outcome and mortality, and to help decisions about treatment and management strategies (12-27). The most remarkable scales in common clinical use for CAP in the ED are CURB-65 and CRB-65 (12-14) which showed some limitations but also high specificity and a high positive predictive value. CURB-65 prognostic rule was developed in 2003 (14), starting from a British Thoracic Society (BTS) study conducted in 1996 (13), and further moving from the m-BTS rule described in 1987 (12) concerning a severity assessment based on few variables which can easily be obtained at presentation or admission to hospital, and strongly associated with death from CAP. Among others, Pneumonia Severity Index (PSI) (15) is a well validated and widely adopted SSS indeed, but it is known to be an unsuitable tool for the ED scenario for the acute management of CAP, and mostly for outpatients (28, 29): it is neither easy to remember nor to compute, it is time consuming because it consists of 20 items, invasive tests as arterial blood gas analysis can often be required.

Many lights and shadows, and pros and cons, have been debated in last twenty years about the usefulness of SSSs for CAP (30-34), mainly in the emergency setting (5, 35-45), due to the little help coming from evidence based medicine in this scenario. The prognostic accuracy of SSSs is well established in hospitalized patients, but much less is known about their use in out-patients (46, 47). However, admission rates for low risk patients with CAP are known to be as high as 60% (48-50), which calls into question the ability of SSS to correctly predict the need for hospitalization, and, on the other hand, the accuracy of EPs initial judgment in making the appropriate admission disposition.

Premise of this work was to critically analyze "bounce back" cases: CAP patients who, at their first presentation to the ED, were discharged for outpatient management and subsequently rebounded to the ED and were then admitted for in-hospital treatment. These patients, taken as a whole, represent a critical point and a "failure" to be avoided, since any delay due to a wrong risk stratification could determine very bad prognostic consequences and worsen the outcome.

The aim of this study was then to evaluate the frequency and the impact of discharging from the ED non-low-risk patients with CAP, according to CURB-65 score (≥2) or CRB-65 score (≥1), the rate of return visits to the ED, the rate of rebound cases with subsequent admittance, and 30-day mortality.

We focused on return cases to determine the ability of SSSs to correctly and accurately predict outcome and mortality in patients discharged with main diagnosis of CAP in the ED. We then critically analyzed those cases in which the EP's choice to discharge home a patient with CAP for OOH management and treatment disagreed with the high-intermediate (non-low) risk profile established by SSSs.

Table 1. CURB-65 and CRB-65 severity scores for community-acquired pneumonia

Clinical factor	Score
C: Confusion	0-1
U: Urea >43 mg / dL	0-1
R: Respiratory rate ≥30 breaths per minute	0-1
B: systolic Blood pressure <90 mm Hg or diastolic Blood pressure ≤60 mm Hg	0-1
65: age ≥ 65 years	0-1
Total score	**Score**
CURB-65	0-5
CRB-65	0-4

Materials and methods

We conducted an observational prospective clinical single-center study in the acute setting of the ED of a university teaching hospital (5), enrolling and following up every consecutively non-selected adult patient (aged ≥14 years) with CAP discharged home for OOH treatment.

Diagnosis of CAP was defined on the presence of new infiltrates on chest X-rays with physical findings and compatible history (5).

Cases satisfying diagnostic criteria for health-care acquired pneumonia (HCAP) or ventilation-associated pneumonia (VAP) (51) were not included in the analysis.

CURB-65 and/or CRB-65 (table 1) were measured and recorded in every patient. Confusion was defined as new disorientation in person, space or time (14). Urea was tested as mg/dl, respiratory rate (RR) as breaths per minute (bpm), systolic blood pressure (SBP) and diastolic blood pressure (DBP) as mmHg.

We prospectively analyzed, in the 1 year period of our study (between April 20th 2013 and April 19th 2014), demographic, medical, clinical and laboratory data recorded in the ED, and the outcome ("rebounds" in 30 days). We then compared two study groups: "discharged and non-readmitted" versus "discharged and rebounded and then admitted", including every rebound to our ED within 30 days of discharge from the ED itself because of CAP related unresolved problems.

The University Hospital database was then queried for length of stay and bed days in both the Intensive Care Unit (ICU), and/or High Medical Dependency Unit (HMDU), and/or regular ward for all patients subsequently admitted to the hospital.

Due to the limited number of cases "rebounded and admitted", the comparison of categorical variables was performed using percentages; media, median, minimum and maximum were instead used for the comparison of continuous data.

Results

Two-hundred and forty-nine patients (media 0.68/day) were emergently evaluated and discharged home for OOH treatment with main diagnosis of CAP [in the same period approximately 817 subjects were admitted with the same diagnosis (52, 53)]; 169 (67.9%) cases resulted in the low-risk class according to CURB-65 or CRB-65 score, the remaining 80 (32.1%) were at high-intermediate risk.

The mean and median age were 42 and 44 years, respectively (range 15-92). One-hundred and thirty-three (53.4%) were female. One-hundred and fourteen patients (45.8%) had been visited by a physician after the debut of symptoms and before the presentation to the ED; 97 (39.0%) were already taking oral antibiotics when they first came to the ED, and 32 (12.9%) had been recommended for other treatment because of respiratory symptoms before presenting to the ED. For-

ty-five patients (18.1%) were sent to the ED following the recommendation by a primary care or a consulting physician, and 41 (16.5%) were transported to the ED by an ambulance. One-hundred and forty-six (58.6%) were discharged with recommendation to an antibiotic combination therapy, the remaining 103 (41.4%) with a single antimicrobial treatment. Twenty-four (9.6%) had an in-hospital follow up consultation planned in the next days at discharge from the ED.

Of 249 discharged patients, 228 (91.6%) didn't return to our ED for CAP related problems at 30 days, and 21 (8.4%) bounced back; of these last 21 individuals, 9 were discharged once again (3.6% of all, 42.9% of rebounded) to outpatient treatment, and the remaining 12 (4.8% of total, 57.1% of rebounded) were then admitted for in-hospital management at their second presentation to the ED.

The mean interval between the first and second presentation to the ED for return visits was 7 days (range 0-20, median 4); for "rebounded and then admitted" cases it was 4 days (range 0-4, median 2), respectively.

When looking at the differences, although the low number of cases in the return cases cohort, patients admitted after having been discharged showed some slight distinguishing features (Table 2) in laboratory parameters (in particular, abnormal coagulation and renal function) and peculiar severe chest X-rays characteristics (two or more infiltrates, bilateral infiltrates, lobar infiltrates, pleural effusion).

Admission to the ICU was never required for these patients, neither mechanical ventilation nor inotropic infusion was needed in the ED.

The mean in-hospital length of staying for rebounded and admitted patients was 9 days (range 3-15, median 8). None of them died in-hospital; they all were discharged home; they all were alive after 30 days.

The characteristics and parameters for comparison of the two study groups (discharged versus returned and admitted) are shown in detail in Table 2, 3, 4 and 5.

Urea was measured in 122 (49.0%) of all discharged patients, so CURB-65 score was not available in 51.0% cases; it was possible to assess CRB-65 for all 249 patients. Patients discharged and not rebounded in 30 days had urea measurement in 115 cases (48.5%), so it was possible for them to calculate both CRB-65 and CURB-65 score; rebounded and admitted had urea in 7 (58.3%) (Table 4 and 5).

Of all discharged patients with CAP, 80 (32.1%) were at "non-low" (high-intermediate) risk of mortality according to SSSs (CURB-65 ≥2 or CRB-65 ≥1). Five discharged patients even resulted in a high risk for mortality (CURB-65 = 3); 1 of them was rebounded and then admitted. In the non-low risk 80 patients group, just 5 (6.3%) were between those who bounced back and were then admitted.

Focusing on the group of 12 patients rebounded and then admitted, the trend of SSSs comparing first and second presentation to the ED is noteworthy (table 6): 7 of them (58,3%) were previously discharged with low risk profile according to SSS (CURB-65 <2 and CRB-65 <1) at their first presentation, the remaining 5 (41,7%) with non-low (high-intermediate) risk profile. At their second presentation 8 of 12 patients (66,7%) were at low risk, and 4 (33,3%) at non-low risk; in 4 cases SSS dropped 1 point, and in 1 case risk profile lowered (from intermediate to low); 3 of 4 patients with intermediate risk of mortality at second presentation were considered non-low because of CRB-65 = 1 just due to age ≥65 years.

Discussion and conclusions

Return visits of patients discharged from the ED usually represent a failure for EPs. Risk stratification for CAP in the ED represents a challenge: the decision to safely discharge home for OOH management needs both adequate clinical and welfare conditions (5, 31, 40, 41, 45, 47, 56-59).

Our results did not confirm the ability and strengh of CURB-65 and CRB-65 to correctly predict mortality for CAP patients discharged home from the ED.

In this regard, it has to be stressed the original meaning of SSSs; in particular, CURB-65 was born as a score to focus on CAP adult patients admitted to in-hospital treatment, to analyze and define prognostic factors related to in-hospital mortality versus survival to discharge, to improve the prediction of mortality and the identification of patients requiring admission to ICU (13, 14). CURB-65 was not conceived

Table 2. Comparison of the two study groups ("simply discharged" versus "discharged, rebounded and then admitted"): media, median and range

	Discharged and never admitted				Discharged, rebounded and then admitted			
	Mean	Median	Min	Max	Mean	Median	Min	Max
Age (years)	43	42	15	94	60	59	40	83
Time spent in the ED (hours:minutes)	3:32	3:12	0:27	15:09	4:26	4:25	1:07	8:02
SBP (mm Hg)	125	120	90	200	130	120	110	180
DBP (mm Hg)	75	78	60	100	79	80	70	100
MBP (mm Hg)	92	92	70	133	96	93	83	127
HR (ppm)	92	90	58	130	92	96	66	118
RR (bpm)	14	14	12	30	15	15	12	30
GCS	15	15	15	15	15	15	14	15
SpO_2	98	98	88	100	97	98	93	99
Temperature (°C)	37,2	37,2	36,0	40,0	37,1	37,0	36,0	38,0
White Blood Cells x10^3/mm^3	10,15	9,23	2,56	27,83	10,44	8,55	4,33	18,13
Hemoglobin mg/dl	13,8	13,7	10,5	17,6	12,9	12,9	10,9	15,4
Hematocrit %	40,1	40,0	30,2	48,8	38,1	39,4	32,7	42,7
Platelets x10^3/mm^3	268	249	50	695	231	228	108	348
Prothrombin Time - International Normalized Ratio	1,15	1,07	1,00	2,71	1,67	1,31	1,15	2,09
Activated Partial Thromboplastin Time ratio	1,15	1,14	0,90	1,60	1,50	1,41	1,18	1,96
Glucose mg/dl	106	102	65	193	130	126	92	168
Urea mg/dl	32	29	5	184	65	37	18	194
Creatinine mg/dl	0,86	0,82	0,50	3,60	1,11	1,01	0,56	2,05
Sodium mEq/l	140	140	128	148	136	137	126	140
Potassium mEq/l	4,2	4,1	3,1	6,5	4,5	4,3	3,5	6,6
Chloride mEq/l	102	102	96	111	96	96	94	98
Calcium mEq/l	9,0	9,0	7,7	10,4	9,1	9,2	8,6	9,6
Protein	7,2	7,3	5,9	8,4	7,2	7,2	6,7	7,6
Albumin	4,3	4,4	3,2	4,9	3,7	3,7	3,5	3,8
Bilirubin mg/dl	0,5	0,5	0,2	2,0	1,0	0,9	0,3	1,9
Aspartate (Glutamate - Oxaloacetate) Transaminase U/l	27	21	10	91	18	19	9	27
Alanine (Glutamate - Pyruvate) Transaminase U/l	28	21	6	144	18	17	7	27
Amylase	54	52	25	100	54	54	36	71
Creatine Kinase U/l	126	83	17	715	98	59	30	205
Cholinesterase	7,3	7,3	2,8	10	6,2	4,3	3,3	11
C Reactive Protein mg/l	7,48	4,51	0,05	40,34	9,76	6,52	0,46	33,36

or validated to identify patients at low risk of mortality who might be suitable for early hospital discharge and OOH management, since the final decision on the appropriate discharge of a patient depends on clinical judgment, on social and family contexts, and not merely on the application of a score.

About one third (80 cases; 32.1%) of patients discharged from our ED with CAP had an intermediate/ high mortality risk according to SSSs (CURB-65 ≥2 or CRB-65 ≥1): following the recommendations coming from main SSSs, all of them should have been hospitalized for supervised treatment or even urgent admission; moreover, some of them (5 cases) should also have been evaluated and considered suitable for the admission to the ICU (in high risk cases, CURB-65 ≥3) (4, 6, 14). In facts, in our series, 5 discharged patients resulted in a high risk for mortality because of a CURB-65 score = 3, but only 1 of them bounced back and was then admitted. Moreover, no patient with CAP discharged for OOH treatment died in the 30 days follow up period.

In the everyday real-life of the ED, very often clinical judgment and score enforcement disagree; our experience show that prioritizing the weighted clinical decision, even if against prediction rules, does not increase neither the risk of mortality nor the rate of ad-

Table 3. Comparison of the two study groups ("simply discharged" versus "discharged, rebounded and then admitted"): rates (%)

	Discharged and never admitted		Discharged, rebounded and then admitted	
	Yes %	No%	Yes %	No%
Gender: Female	57,8	42,2	50,0	50,0
Previous visit by primary care or consulting physician (because of new respiratory symptoms)	45,1	54,9	58,3	41,7
Already in antibiotic therapy at presentation to the ED	39,1	60,9	41,7	58,3
Other (then antibiotic) new treatment for respiratory symptoms	13,1	86,9	8,3	91,7
Presentation to the ED recommended by primary care or consulting physician	18,1	81,9	16,7	83,3
Carriage to the ED by ambulance service	16,0	84,0	25,0	75,0
Typical CAP clinical presentation	82,7	17,3	83,3	16,7
Dyspnoea	14,8	85,2	16,7	83,3
Kelly-Matthay scale >1 (52)	0,0	100,0	8,3	91,7
ABG performance rate	6,3	93,7	8,3	91,7
Multiple (>1) consolidations at chest radiograph	8,9	91,1	0,0	100,0
Bilateral shadowing at chest radiograph	4,6	95,4	12,3	87,7
Pleural effusion at chest radiograph	6,3	93,7	33,3	66,7
Recommended combination antibiotic home treatment at discharge	58,6	41,4	58,3	41,7
Ambulatory care follow-up planned after discharge from the ED	8,4	91,6	33,3	66,7
Rebound to the ED because of CAP related problems in 30 days	3,8	96,2	100,0	0,0

Table 4. Comparison of the two study groups ("simply discharged" versus "discharged, rebounded and then admitted"): CURB-65 and CRB-65 rates

	Discharged and never admitted						Discharged, rebounded and then admitted					
Total score	0	1	2	3	4	5	0	1	2	3	4	5
CURB-65	70 (60,9 %)	25 (21,7 %)	16 (13,9 %)	4 (3,5 %)	0 (0,0 %)	0 (0,0 %)	2 (28,6 %)	2 (28,6 %)	2 (28,6 %)	1 (14,3 %)	0 (0,0 %)	0 (0,0 %)
CRB-65	162 (68,4 %)	60 (25,3 %)	15 (6,3 %)	0 (0,0 %)	0 (0,0 %)		7 (58,3 %)	3 (25,0 %)	2 (16,7 %)	0 (0,0 %)	0 (0,0 %)	

Table 5. Comparison of the two study groups ("simply discharged" versus "discharged, rebounded and then admitted"): CURB-65 and CRB-65 details

	Discharged and never admitted		Discharged, rebounded and then admitted	
point	0	1	0	1
C: Confusion	237 (100,0 %)	0 (0,0 %)	11 (91,7 %)	1 (8,3 %)
U: blood Urea nitrogen >43 mg/dL	96 (83.5 %)	19 (16.5 %)	4 (57,1 %)	3 (42,9 %)
R: Respiratory rate ≥30 breaths per minute	202 (85,2 %)	35 (14,8 %)	10 (83,3 %)	2 (16,7 %)
B: systolic Blood pressure <90 mm Hg or diastolic Blood pressure ≤60 mm Hg	216 (91,1 %)	21 (8,9 %)	12 (100,0 %)	0 (0,0 %)
65: age ≥65 years	201 (84,8 %)	36 (15,2 %)	8 (66,7 %)	4 (33,3 %)

verse events in CAP outpatients managed and treated OOH.

Evidence from many studies clearly demonstrated how SSSs are of limited usefulness for deciding about CAP patients hospitalization: clinical judgement and the whole "holistic" evaluation of technical and non-technical aspects (as frailty, comorbilities, welfare conditions, characteristics of continuity of care in the

Table 6. Comparison of SSS at first and second presentation in "discharged, rebounded and then admitted" patients

Patient ID number	n 1	n 2	n 3	n 4	n 5	n 6	n 7	n 8	n 9	n 10	n 11	n 12
First presentation												
CURB-65 score (1 point in C, U, R, B and or 65)	1 (R)	3 (U, R, 65)	1 (65)	0	0	1 (U)	0	0	0	2 (C, 65)	0	2 (U, 65)
CRB-65 score (1 point in C, R, B and/or 65)	1 (R)	2 (R, 65)	1 (65)	0	0	0	0	0	0	2 (C, 65)	0	1 (65)
Risk of mortality	non-low	non-low	non-low	low	low	low	low	low	low	non-low	low	non-low
Second presentation												
CURB-65 score (1 point in C, U, R, B and or 65)	0	3 (U, R, 65)	1 (65)	0	0	0	0	0	0	1 (65)	0	1 (65)
CRB-65 score (1 point in C, R, B and/or 65)	0	2 (R, 65)	1 (65)	0	0	0	0	0	0	1 (65)	0	1 (65)
Risk of mortality	low	non-low	non-low	low	low	low	low	low	low	non-low	low	non-low
Delta points (second presentation versus first)	-1	0	0	0	0	-1	0	0	0	-1	0	-1
Delta risk of mortality (from first to second presentation)	from "non-low" to low	=	=	=	=	=	=	=	=	=	=	=

community, etc.) make the difference for real-life bedside decisions; several cases considered at low risk are still managed in-hospital because of a number of "good reasons" (5, 31-33, 40, 41, 52, 53).

Many patients with a intermediate-high risk according to SSSs can safely be treated as outpatients, when adequate welfare conditions are present. In this scenario, we identified a group of patients, in particular those with abnormal coagulation and impairment of renal function or chest X-rays complications (56, 60), deserving a brief intensive observation period (6 to 36 hours) in a Short Stay Unit (SSU) in the ED, to assess the effectiveness of therapy, to ascertain the maintenance of clinical stability, and to contact the General Practitioner (GP) before the final decision to safely discharge or admit (41, 49, 56, 58, 59).

Of course, in this cohort of acute CAP patients directed to OOH management by the EP, the impairment of both renal function tests and coagulation system were not due neither to sepsis nor septic shock, but rather to chronic diseases (such as chronic renal failure) and pharmacological therapy (such as warfarin).

Future large prospective studies are required to draw more definite conclusions, and to define which parameters, features and markers are needed to develop and validate a new or modified SSS, in order to increase the weight and value of some pivotal aspects in the "triage" process of CAP patients in the ED, leading to a better performance and discriminative capability to focus on the real need for hospitalization in every single patient.

Our study has some noticeable limitations: it's a prospective study from a single-center, there is no standardized method of RR measurement, return visits after admission have not been considered, and the reasons of hospitalization were deduced from clinical records. The city of Bologna (Italy) has nearly 1 million resident inhabitants in the whole province area; the main town has just 2 public Hospitals with an ED, serving the population of 400 thousand people for adults acute medical care: the University Teaching Hospital on the eastern side (the one in which our study was performed), and the Trauma Centre in the western part: we can not rule out that some patients

who have been discharged from our hospital bounced back to other hospitals, even if the regional organization of the Emergency Ambulance Service in our town makes it unlikely.

This work has also some newsworthy strengths: we prospectively and systematically studied a large sample of unselected consecutive patients during a 1 year ongoing and uninterrupted period; the site of the study was an "Internal Medicine" Emergency Department (University Hospital with separated triage for Pediatrics, Obstetrics, Ophthalmology and Orthopedics patients, non Trauma-Center). The majority of published experiences about CAP patients selected for OOH treatment starts up and moves from cases at low risk of death according to SSS, and then discharged home. Our study turns the point of view downside up: in fact we analyzed the real-life CAP cases discharged from the ED for outpatient management regardless of the degree of SSSs, we prospectively recorded their outcome, and then re-evaluate "ex post", by an epicrisis, the decision process about site of treatment according to their risk of death early established by SSS at presentation to the ED. This was the first study to investigate discharge among non-low risk patients with CAP in the ED of a University Hospital referring to CURB-65 and CRB-65 scores; this should allow our results to be generalised even to other hospitals and countries which share a similar healthcare system.

In conclusion, in this real-life study, predictive rules, widely used in the ED for CAP to establish both the prognosis and the outcome, don't seem to be of help in the decision about a proper discharge of a patient for OOH treatment. Many carefully selected patients, although by SSS application present a non-low risk of mortality, can be safely managed as outpatients if welfare, social and familiar resources are available. Our study doesn't support international guideline recommendations that pneumonia severity scores should be used as an adjunct to clinical judgement when assessing the indication for outpatient management of CAP patients in the community. These findings may have implications for discharge planning and follow up of patients with CAP. A SSU in the ED can be an attractive alternative to prevent rebounds and new admissions during the 30 days following discharge in a subgroup of particularly CAP frail cases, identified by the presence of some laboratory and/or radiological "red flags".

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