

## When should you admit a patient with suspected CAP?

### Evidence-based answer

When the patient has 2 or more of the following CURB-65 criteria: respiratory rate  $\geq 30$ , acute confusion, low blood pressure (systolic blood pressure  $< 90$  or diastolic BP  $\leq 60$  mm Hg), blood urea nitrogen [BUN]  $> 19.6$  mg/dL, and age  $\geq 65$  years (strength of recommendation [SOR]: **B**, based on 3

prospective cohort studies). Alternatively, consider hospitalization for patients presenting with a Pneumonia Severity Index (PSI) class of 4 or 5 (SOR: **B**; 1 prospective cohort study). There are no studies that test whether using these rules improve outcomes over standard care.

### Clinical commentary

#### What about the homeless man, or the debilitated woman?

I occasionally work in my community hospital's emergency room. Clinical decision rules are often very helpful, but they are limited when dealing with special populations, such as patients who are immunosuppressed or pregnant, or those with underlying cardiac or lung disease.

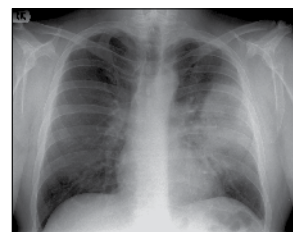
In addition, there are often social factors that must be taken into account

when considering admitting a patient. For instance, a homeless man may not be able to purchase his medications; a debilitated woman living alone may not be able to adequately care for herself, despite a low CURB-65 score. Clinical decision rules provide a useful starting point, but they are meant to supplement, not replace, clinical decision-making.

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### FAST TRACK

**Patients with 2 or more factors from the CURB-65 criteria have an increased risk of mortality from community-acquired pneumonia**

### Evidence summary

#### The CURB-65 criteria: Having $\geq 2$ factors increases mortality

In a split-sample (derivation and validation) analysis<sup>1</sup> of 3 prospective studies involving 1068 patients presenting to the hospital with the diagnosis of pneumonia, various clinical features were analyzed for their association with 30-day mortality. The 5 parameters that were most strongly associated with mortality were:

- acute confusion (odds ratio [OR]= 8.1; 95% confidence interval [CI],

4.8–13.7)

- BUN  $> 19.6$  mg/dL (OR= 5.6; 95% CI, 3.1–10)
- respiratory rate  $\geq 30$  (OR=1.7; 95% CI, 1.07–2.8)
- low blood pressure (SBP  $< 90$  or DBP  $\leq 60$ ) (OR=2.4; 95% CI, 1.4–3.8)
- age  $\geq 65$  years (OR=5.5; 95% CI, 2.8–10.9).

The 30-day mortality estimation using these 5 criteria is called CURB-65 (Confusion, Urea, Respiratory rate, low Blood pressure, and age  $\geq 65$ ).

In patients with 2 or more of these

TABLE 1

## CURB-65 criteria

CURB-65 criteria		
<p><b>Give 1 point for each:</b></p> <ul style="list-style-type: none"> <li>• Confusion</li> <li>• BUN &gt;19.6 mg/dL</li> <li>• Respiratory rate <math>\geq</math>30</li> <li>• Low BP (SBP &lt;90 or DBP <math>\leq</math>60)</li> <li>• Age <math>\geq</math>65</li> </ul>		
SCORE	30-DAY MORTALITY	POSSIBLE TREATMENT OPTIONS
0 or 1	Low (1.5%)	Consider outpatient treatment
2	Intermediate (9.2%)	Short-stay hospitalization or closely monitored outpatient therapy
3 or more	High (22%)	Hospitalize and consider ICU
Source: Lim et al 2003. <sup>1</sup>		

factors, the associated rate of mortality increased significantly compared with patients who had none or only 1 of the factors (TABLE 1). Although albumin <3.0 g/dL was also significantly associated with an increased mortality rate (OR=4.7; 95% CI, 2.5–8.7), it was not included in CURB-65 because it is not a routine lab ordered for patients with pneumonia.

A variation of the CURB-65 score, CRB-65, uses only the clinical parameters without laboratory data (confusion, respiratory rate, blood pressure, and age). Patients with a score of 0 had a 0.9% 30-day mortality rate. However, the rate increased to 8.15% when patients had 1 or 2 of the 4 clinical criteria.

### Pneumonia Severity Index has similar sensitivity to CURB-65

A more detailed assessment using 20 parameters called the Pneumonia Severity Index (PSI) was derived and validated in separate cohorts (TABLE 2).<sup>2</sup> When compared with CURB-65 and CRB-65, the PSI has similar sensitivity and specificity in predicting 30-day mortality.<sup>3</sup> All 3 predictive rules had high negative predictive values for mortality but a low positive predictive value at all cutoff points.

Larger proportions of patients were identified as low-risk by PSI (47.2%) and CURB-65 (43.3%) than by CRB-

65 (12.6%). Therefore PSI and CURB-65 are much more helpful in identifying patients who could be treated in the outpatient setting.

### Recommendations from others

The 2007 Infectious Diseases Society of America (IDSA) and American Thoracic Society (ATS), in their Consensus Guidelines on the Management of Community-Acquired Pneumonia,<sup>4</sup> concluded that severity-of-illness scores, such as the CURB-65 or PSI, can be used to identify patients with CAP who may be candidates for outpatient treatment (evidence level I by IDSA/ATS rating).

The guidelines recommend that objective criteria or scores always be supplemented with physician determination of subjective factors, including the ability to safely and reliably take oral medication and the availability of outpatient support resources. Also, CURB-65 is more suitable than PSI for use in the emergency department because of its simplicity of application and ability to identify low-risk patients (evidence level II).<sup>4</sup> ■

### References

1. Lim WS, van der Eerden MM, Laing R, et al. Defining community acquired pneumonia severity on presentation to hospital: an international derivation and validation study. *Thorax* 2003; 58:377–382.
2. Fine MJ, Auble TE, Yealy DM, et al. A prediction rule to identify low-risk patients with community-acquired pneumonia. *N Engl J Med* 1997; 336:243–250.

### FAST TRACK

## The Pneumonia Severity Index has similar sensitivity as CURB-65

TABLE 2

## Pneumonia Severity Index

CHARACTERISTIC	POINTS ASSIGNED	
<b>Demographic factors</b>		
Age, men	Age in years	
Age, women	Age in years –10	
Nursing home resident	+10	
<b>Coexisting illnesses</b>		
Neoplastic disease	+30	
Liver disease	+20	
Congestive heart failure	+10	
Cerebrovascular disease	+10	
Renal disease	+10	
<b>Physical examination findings</b>		
Altered mental status	+20	
Respiratory rate $\geq 30$ /min	+20	
Systolic blood pressure $< 90$ mm Hg	+20	
Temperature $< 35^\circ\text{C}$ ( $95^\circ\text{F}$ ) or $\geq 40^\circ\text{C}$ ( $104^\circ\text{F}$ )	+15	
Pulse $\geq 125$ beats/min	+10	
<b>Laboratory and radiographic findings</b>		
Arterial blood pH $< 7.35$	+30	
Blood urea nitrogen level $\geq 30$ mg/dL	+20	
Sodium level $< 130$ mmol/L	+20	
Glucose level $\geq 250$ mg/dL	+10	
Hematocrit $< 30\%$	+10	
Partial pressure of arterial $\text{O}_2$ $< 60$ mm Hg or $\text{O}_2$ saturation $< 90\%$ on pulse oximetry	+10	
Pleural effusion	+10	
<b>RISK CLASS</b>	<b>POINTS</b>	<b>30-DAY MORTALITY</b>
I	0–50	0.1%–0.4%
II	51–70	0.6%–0.7%
III	71–90	0.9%–2.8%
IV	91–130	8.3%–9.3%
V	$> 130$	27.0%–31.1%

Patients in classes I, II, and III can be managed on an outpatient basis; patients in classes IV and V should be hospitalized.

Source: Fine et al 1997.<sup>2</sup>

- Yan Man S, Lee N, Ip M, et al. Prospective comparison of three predictive rules for assessing severity of community-acquired pneumonia in Hong Kong. *Thorax* 2007; 62:348–353.
- Mandell LA, Wunderink RG, Anzueto A, et al. Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults. *Clin Infect Dis* 2007; 44(Suppl 2):S27–S72.