

# ER-GS COMBINE CONFERENCE

報告者：R1許力云  
 指導者：VS林立偉  
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## Discussion

- How to predict pneumonia outcome
- PSI
- CURB-65
- SMART COP
- Sepsis bundle

## CLINICAL TOOL TO PREDICT CAP PROGNOSIS

- PSI SCORE (N Engl J Med 1997;336:243e50.)
- CURB 65(Thorax 2003;58:377e82.)
- CRB 65 (Thorax 2008;63:665e6.)

\*30 days mortality rate

Patient Characteristics	Points Assigned	Patient's Points
<b>Demographic Factors</b>		
Age (in years)	age	
Males	age - 10	
Females		
Nursing home resident	+ 10	
<b>Coexisting Conditions*</b>		
Neoplastic disease	+ 30	
Liver disease	+ 20	
Congestive heart failure	+ 10	
Cerebrovascular disease	+ 10	
Renal disease	+ 10	
<b>INITIAL Physical Examination Findings</b>		
Altered mental status (acute)*	+ 20	
Respiratory rate $\geq$ 30/min.	+ 20	
Systolic BP $<$ 90 mm Hg	+ 20	
Temperature $<$ 35 or $\geq$ 40 °C ( $<$ 95 ° F or $>$ 104 ° F)	+ 15	
Pulse $\geq$ 125/min	+ 10	
<b>INITIAL Diagnostic Test Findings (score zero if not tested)</b>		
pH $<$ 7.35	+ 30	
BUN $>$ 30 mg/dl	+ 20	
Sodium $<$ 130 mEq/L	+ 20	
Glucose $>$ 250 mg/dl	+ 10	
Hematocrit $<$ 30%	+ 10	
pO <sub>2</sub> $<$ 60 mmHg or O <sub>2</sub> sat $<$ 90%	+ 10	
Pleural effusion	+ 10	

PSI

PSI Score	Category (Circle One)	Projected Mortality*
$\leq$ 70	I, II	$<$ 1%
71 - 90	III	2.8%
91 - 130	IV	8.2%
$>$ 130	V	29.2%

A. Class 1-2: Outpatient management  
 B. Class 3: Consider short observation hospital stay  
 C. Class 4-5: Inpatient management

## CURB 65

Clinical factor	Points
Confusion	1
Blood urea nitrogen $>$ 19 mg per dL	1
Respiratory rate $\geq$ 30 breaths per minute	1
Systolic blood pressure $<$ 90 mm Hg or Diastolic blood pressure $\leq$ 60 mm Hg	1
Age $\geq$ 65 years	1
<b>Total points:</b>	

CURB-65 score	Deaths/total (%)*	Recommendation†
0	7/1,223 (0.6)	Low risk; consider home treatment
1	31/1,142 (2.7)	
2	69/1,019 (6.8)	Short inpatient hospitalization or closely supervised outpatient treatment
3	79/563 (14.0)	Severe pneumonia; hospitalize and consider admitting to intensive care
4 or 5	44/158 (27.8)	

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Confusion	1
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Respiratory rate $\geq$ 30 breaths per minute	1
Systolic blood pressure $<$ 90 mm Hg or Diastolic blood pressure $\leq$ 60 mm Hg	1
Age $\geq$ 65 years	1
<b>Total points:</b>	

CRB-65 score‡	Deaths/total (%)*	Recommendation†
0	2/212 (0.9)	Very low risk of death; usually does not require hospitalization
1	18/344 (5.2)	Increased risk of death; consider hospitalization
2	30/251 (12.0)	
3 or 4	39/125 (31.2)	High risk of death; urgent hospitalization

# WHICH IS BETTER?

## Severity assessment tools for predicting mortality in hospitalised patients with community-acquired pneumonia. Systematic review and meta-analysis

James D Chalmers,<sup>1</sup> Arun Singanayagam,<sup>2</sup> Abban R Akam,<sup>2</sup> Pabini Mandai,<sup>2</sup> Philip M Short,<sup>2</sup> Gourab Choudhury,<sup>2</sup> Victoria Wood,<sup>2</sup> Adam T Hill<sup>2</sup>

Additional tables are available online only. To view these files please visit the journal website (http://thorax.bmj.com/).

Correspondence to: James D Chalmers, Department of Respiratory Medicine, Royal Victoria Infirmary, University of Glasgow, Glasgow G4 7DU, UK; james.chalmers@glasgow.ac.uk

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**ABSTRACT**  
**Introduction:** International guidelines recommend a severity based approach to management in community acquired pneumonia. CURB65, CRB65 and the Pneumonia Severity Index (PSI) are the most widely recommended severity scores. The aim of this study was to compare the performance characteristics of these scores for predicting mortality in community-acquired pneumonia.  
**Methods:** A systematic review and meta-analysis was performed according to MOOSE (meta-analysis of observational studies in epidemiology) guidelines. PubMed and EMBASE were searched (1987–2009). 45 studies reporting prognostic information for the PSI, CURB65 and CRB65 severity scores were identified. Performance characteristics were pooled using random effects models. Heterogeneity between analyses and specificity were pooled using summary receiver operating characteristic (SROC) curves.  
**Results:** All three scores predicted 30 day mortality. The PSI had the highest area under the ROC curve (0.81 (95% CI 0.782–0.838), compared with CURB65, 0.80 (95% CI 0.781–0.819) and CRB65, 0.79 (95% CI, 0.769–0.810). There were no significant differences in overall test performance between PSI, CURB65 and CRB65 for predicting mortality from community-acquired pneumonia.

Severity scores may overstate their difficulties by providing objective classification of patients into low, intermediate and high risk categories based on robust, validated markers of poor outcome.<sup>1</sup> The most commonly studied scoring systems, the Pneumonia Severity Index (PSI), was introduced in 1997 following a study of 10,000 patients with CAP.<sup>2</sup> This 20-point score (details are included in the online supplement) classified patients into five risk categories (I–V) based on their presenting risk of death within 30 days. However, its limitation is its heavily weighted by age and comorbid disease, and the large number of variables makes it complex to use in a busy emergency department.<sup>3</sup>

Recognising this, the British Thoracic Society (BTS) subsequently derived its own, more simple prediction tool (CURB65), also based on the risk of 30 day mortality. In 2005, Iain and colleagues modified this score with the addition of age and other risk factors, to create CRB65 (details of each severity score are included in the online supplement).<sup>4</sup> This score is significantly easier to remember and use than the PSI, being composed of only five variables with a single point awarded for each. CURB65, without requirement to measure blood urea, is recommended for convenience.

Thorax 2010;65:878e883.

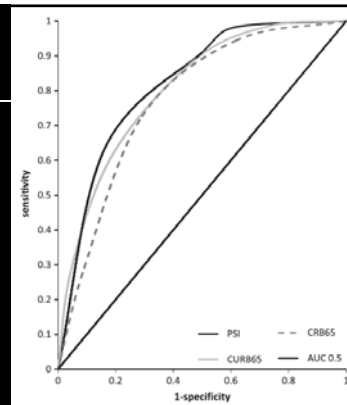
	Sensitivity	Specificity
<b>PSI</b>		
≡ III	98.2% (97.8–98.5%)	38.8% (38.4–39.2%)
≡ IV	91.4% (90.8–92.1%)	49.5% (49.2–49.9%)
≡ V	63.2% (62.1–64.3%)	83.6% (83.4–83.9%)
<b>CURB65</b>		
≡ 1	98.6% (97.6–99.2%)	26.5% (26.5–27.4%)
≡ 2	89.1% (87.1–90.8)	52.2% (51.3–53.1%)
≡ 3	62.0% (59.3–64.6%)	80.8% (80.2–81.4%)
≡ 4	29.0% (26.3–31.8%)	95.3% (95.0–95.7%)
<b>CRB65</b>		
≡ 1	94.4% (94.2–94.6%)	38.3% (38.1–38.5%)
≡ 2	72.7% (69.3–76.0%)	70.8% (69.8–71.8%)
≡ 3	29.1% (28.8–29.5%)	90.9% (90.8–91.0%)

Thorax 2010;65:878e883.

	Observed mortality	Predicted mortality	RR (95% CI)	p Value	I <sup>2</sup>
<b>PSI</b>					
I–II	0.75%	0.3%	2.24 (1.27 to 3.96)	0.005	0%
I–III	1.6%	0.4%	3.64 (2.72 to 4.87)	<0.00001	0%
IV	8.9%	9.3%	0.91 (0.79 to 1.06)	0.2	48%
V	28.2%	27%	0.99 (0.88 to 1.11)	0.9	57%
<b>CURB65</b>					
0–1	2.0%	1.2%	1.63 (1.11 to 2.40)	0.01	27%
2	8.3%	9%	0.95 (0.74 to 1.21)	0.7	55%
3–5	22.3%	22.6%	1.03 (0.84 to 1.25)	0.8	76%
<b>CRB65</b>					
0	2.3%	0.9%	1.15 (0.45 to 2.94)	0.8	52%
1–2	13.3%	8.1%	1.13 (0.83 to 1.55)	0.4	90%
3–4	34.4%	31.2%	1.06 (0.91 to 1.23)	0.5	31%

PSI, Pneumonia Severity Index.

Thorax 2010;65:878e883.



Thorax 2010;65:878e883.

# CONCLUSION

- There were no significant differences in overall test performance between PSI, CURB65 and CRB65 for predicting mortality from community-acquired pneumonia.

## Scheme 1. Diagnostic criteria for sepsis

Infection, documented or suspected, and some of the following:

### General variables

- Fever (>38.3°C)
- Hypothermia (core temperature <36°C)
- Heart rate >90 min<sup>-1</sup> or >2 sd above the normal value for age
- Tachypnoea
- Altered mental status
- Significant edema or positive fluid balance (>20 mL/kg over 24 hrs)
- Hyperglycemia (plasma glucose >140 mg/dL or 7.7 mmol/L) in the absence of diabetes

### Inflammatory variables

- Leukocytosis (WBC count >12,000 μL<sup>-1</sup>)
- Leukopenia (WBC count <4000 μL<sup>-1</sup>)
- Normal WBC count with >10% immature forms
- Plasma C-reactive protein >2 sd above the normal value
- Plasma procalcitonin >2 sd above the normal value

### Hemodynamic variables

- Arterial hypotension (SBP <90 mm Hg; MAP <70 mm Hg; or an SBP decrease >40 mm Hg in adults or <2 sd below normal for age)

### Organ dysfunction variables

- Arterial hypoxemia (PaO<sub>2</sub>/Fio<sub>2</sub> <300)
- Acute oliguria (urine output <0.5 mL/kg hr or 45 mmol/L for at least 2 hrs, despite adequate fluid resuscitation)
- Creatinine increase >0.5 mg/dL or 44.2 μmol/L
- Coagulation abnormalities (INR >1.5 or a PTT >60 secs)
- Ileus (absent bowel sounds)
- Thrombocytopenia (platelet count <100,000 μL<sup>-1</sup>)
- Hyperbilirubinemia (plasma total bilirubin >4 mg/dL or 70 μmol/L)

### Tissue perfusion variables

- Hyperlactatemia (> upper limit of lab normal)
  - Decreased capillary refill or mottling
- Diagnostic criteria for sepsis in the pediatric population are signs and symptoms of inflammation plus infection with hyper- or hypothermia (rectal temperature >38.5°C or <35°C), tachycardia (may be absent in hypothermic patients), and at least one of the following indications of altered organ function: altered mental status, hypoxemia, increased serum lactate level, or bounding pulses.

Scheme 2.

Severe sepsis = sepsis-induced tissue hypoperfusion or organ dysfunction (any of the following thought to be due to the infection)  
 Sepsis-induced hypotension  
 Lactate greater than the upper limits of normal laboratory results  
 Urine output <0.5 mL/kg hr for >2 hrs, despite adequate fluid resuscitation  
 ALL with PaO<sub>2</sub>/Fio<sub>2</sub> <250 in the absence of pneumonia as infection source  
 ALL with PaO<sub>2</sub>/Fio<sub>2</sub> <200 in the presence of pneumonia as infection source  
 Creatinine >2.0 mg/dL (176.8 μmol/L)  
 Bilirubin >2 mg/dL (34.2 μmol/L)  
 Platelet count <100,000  
 Coagulopathy (INR >1.5)

# SEPSIS RESUSCITATION BUNDLE(in 6 hrs)

The goal is to perform all indicated tasks 100% of the time within the first 6 hours of identification of severe sepsis.

The tasks are:

1. Measure serum lactate
2. Obtain blood cultures prior to antibiotic administration
3. Administer broad-spectrum antibiotic, *within 3 hrs of ED admission and within 1 hour of non-ED admission*
4. In the event of hypotension and/or a serum lactate > 4 mmol/L
  - a. Deliver an initial minimum of 20 mL/kg of crystalloid or an equivalent
  - b. Apply vasopressors for hypotension not responding to initial fluid resuscitation to maintain mean arterial pressure (MAP) > 65 mm Hg
5. In the event of persistent hypotension despite fluid resuscitation (septic shock) and/or lactate > 4 mmol/L
  - a. Achieve a central venous pressure (CVP) of ≥ 8 mm Hg
  - b. Achieve a central venous oxygen saturation (ScvO<sub>2</sub>) ≥ 70 % or mixed venous oxygen saturation (SvO<sub>2</sub>) ≥ 65 %

<http://www.survivingsepsis.com/implement/bundles>

# SEPSIS MANAGEMENT BUNDLE(in 24 hrs)

Efforts to accomplish these goals should begin immediately, but these items may be completed within 24 hours of presentation for patients with severe sepsis or septic shock.

1. Administer low-dose steroids for septic shock in accordance with a standardized ICU policy. *If not administered, document why the patient did not qualify for low-dose steroids based upon the standardized protocol.*
2. Administer drotrecogin alfa (activated) in accordance with a standardized ICU policy. *If not administered, document why the patient did not qualify for drotrecogin alfa (activated).*
3. Maintain glucose control ≥ 70, but < 150 mg/dl
4. Maintain a median inspiratory plateau pressure (IPP)\* < 30 cm H<sub>2</sub>O for mechanically ventilated patients

<http://www.survivingsepsis.com/implement/bundles>



THANKS FOR YOUR ATTANTION