

PROGNOSIS

# Review: 4 clinical signs are precise and accurate for predicting poor outcome in postcardiac arrest coma

Booth CM, Boone RH, Tomlinson G, Detsky AS. Is this patient dead, vegetative, or severely neurologically impaired? Assessing outcome for comatose survivors of cardiac arrest. *JAMA*. 2004;291:870-9.

**QUESTION**

In patients with postcardiac arrest coma (PCAC), is clinical examination precise and accurate for predicting poor outcome?

**METHODS**

**Data sources:** MEDLINE (1966 to 2003), EMBASE/Excerpta Medica (1966 to 2003), 4 sets of conference abstracts (1997 to 2003), bibliographies of relevant articles, standard physical examination textbooks, and researchers in the field.

**Study selection and assessment:** Primary studies that assessed the precision (interobserver agreement) or accuracy of clinical examination for predicting poor outcome (prognosis) in adults (> 10 y of age) with PCAC, and presented relevant outcome data for individual clinical variables measured at discrete time intervals in a way that allowed categorization of the outcome as “good” or “poor.” Study quality was assessed in duplicate using modified criteria previously developed for the Rational Clinical Examination series.

**Outcomes:** Glasgow-Pittsburgh Cerebral Performance Categories: 1) good cerebral performance, 2) moderate cerebral disability, 3) severe cerebral disability, 4) coma or vegetative state, and 5) brain death or death. To create 2 × 2 tables, performance categories 1 and 2 were dichotomized as “good” outcomes and categories 3 to 5 as “poor” outcomes.

**COMMENTARY**

Over 225 000 people die each year from sudden cardiac arrest in the United States. After the cardiac arrest, most patients receive attempted resuscitation and up to 50% reach the hospital alive (1). However, 80% of the survivors would be in PCAC. In the review by Booth and colleagues, 77% of patients with PCAC had a poor neurologic outcome or death. Overall, only about 14% of all patients with cardiac arrest survive to hospital discharge. It is therefore important for physicians to have reliable predictors for identifying which patients in PCAC are unlikely to have meaningful survival when counseling family members and when making decisions on the use of scarce medical resources.

Booth and colleagues reviewed data from several studies and found that 5 simple physical findings (4 of them assessed at 24 h and 1 at 72 h after onset of PCAC) are useful in identifying patients who are not likely to have good neurologic outcomes. Although this information is not new, it is useful, particularly for clinicians in critical care.

The study has some limitations. The physical findings were less useful in predicting good outcomes; and combining the physical signs was not any more useful than any individual sign. It is important to note that physical findings may not be reliable for predicting prognosis

**MAIN RESULTS**

Components of clinical examination assessed included motor response and brainstem reflexes, the Glasgow Coma Scale, and presence of seizures or myoclonus.

**Precision:** 5 studies met the selection criteria. Meta-analyses were not done because of study heterogeneity. However, interobserver agreement was moderate to substantial in each of the studies (range of  $\kappa$  statistic 0.36 to 0.72). 3 studies found no difference in interobserver agreement between experienced nurses, residents, and physicians.

**Accuracy:** 11 studies ( $n = 1914$ ) met the selection criteria. 77% (a random effects estimate with 95% CI 72% to 80%) of patients had a poor outcome. Pooled positive and negative likelihood ratios of the most accurate motor response and brainstem reflexes

for predicting a poor outcome are in the Table. Whereas composite coma scale scores were moderately accurate for predicting a poor outcome, seizures were not good predictors.

**CONCLUSION**

In patients with postcardiac arrest coma, 4 clinical signs (absent corneal and pupillary reflexes, absent motor response, and absent withdrawal to pain) assessed 24 hours after cardiac arrest as well as absent motor response assessed 72 hours after the cardiac arrest are precise and accurate for predicting a poor outcome.

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**Pooled likelihood ratios of clinical signs for predicting a poor outcome (death or vegetative state) in postcardiac arrest coma (PCAC)\***

| Clinical sign plus time after PCAC | Number of studies | +LR (95% CI)       | -LR (CI)         |
|------------------------------------|-------------------|--------------------|------------------|
| Absent withdrawal to pain at 24 h  | 4                 | 4.7 (2.2 to 9.8)   | 0.2 (0.1 to 0.6) |
| Absent pupil response at 24 h      | 4                 | 10.2 (1.8 to 48.6) | 0.8 (0.4 to 1.4) |
| Absent motor response at 24 h      | 4                 | 4.9 (1.6 to 13.0)  | 0.6 (0.3 to 1.3) |
| Absent corneal reflex at 24 h      | 3                 | 12.9 (2.0 to 68.7) | 0.6 (0.2 to 1.9) |
| Absent motor response at 72 h      | 4                 | 9.2 (2.1 to 49.4)  | 0.7 (0.3 to 1.3) |

\*Diagnostic terms defined in Glossary.

< 24 hours after onset of PCAC, so most survivors will require admission to an intensive care unit before informed discussions about prognosis can be made.

Recent studies have shown that somatosensory-evoked potentials are also good predictors of prognosis in hypoxic-ischemic coma (2). Future investigations will probably focus on combining physical findings with technologic innovations, such as somatosensory-evoked potentials, to better refine prognosis. For now, clinicians can be confident that simple physical findings, although imperfect, provide some guidance in these difficult situations.

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**References**

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