

AN AID TO PREDICTING PROGNOSIS IN PATIENTS WITH NON-TRAUMATIC COMA AT ONE DAY

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Neurologists are often asked to give a prognosis of a patient in coma. Table 1 is designed to help provide guidance. The data are extracted from a series of 500 patients with coma from causes other than trauma and overdose.¹ Patients with a Glasgow coma scale of less than 2:4:2 (eye opening; motor; verbal) for more than six hours were included. The data are presented to allow discrimination of patients with the poor outcomes at one year (death, vegetative state, and severe disability) from those with moderate or good outcomes as defined by the Glasgow outcome scale² on the basis of the clinical signs one day after admission.

The raw data indicating the number of patients with each outcome in each neurologic response category at one day are given on the left of the table. The **sensitivity** describes how good the test is at detecting those with poor outcome at one year. The **specificity** describes how good the test is at correctly excluding those individuals with a good prognosis at one year. The **positive predictive value** describes the probability that the outcome will be bad if the patient has the poorer (first) neurological outcome. The **negative predictive value** describes the probability of a good outcome if an individual has the better (second) response.

Table 1 Data from Levy *et al*¹ about patients with non-traumatic coma of more than six hours duration (excluding drug induced coma), showing the relation between physical signs at 24 hours and their long term outcome

	Severe disability or worse	Moderate or good recovery	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Likelihood ratio (positive test)	Likelihood ratio (negative test)
<i>Verbal response</i>								
Incomprehensible or none	187	45	0.96	0.26	0.81	0.67	1.30	0.16
Orientated, confused or inappropriate	8	16						
<i>Eye opening response</i>								
To pain/none	270	42	0.89	0.48	0.87	0.53	1.69	0.24
Spontaneous/to noise	34	38						
<i>Pupillary light reflex</i>								
Absent	78	1	0.26	0.99	0.99	0.26	20.59	0.75
Present	225	79						
<i>Corneal reflex</i>								
Absent	90	0	0.32	1.00	1.00	0.29	20*	0.68
Present	190	77						
<i>Spontaneous eye movements</i>								
Roving dysconjugate, other or none	210	19	0.69	0.77	0.92	0.40	2.94	0.40
Orienting or roving conjugate	94	62						
<i>Oculocephalic responses</i>								
Abnormal/absent	292	61	0.96	0.24	0.83	0.59	1.26	0.18
Normal	13	19						
<i>Oculovestibular responses</i>								
Abnormal	265	45	0.96	0.32	0.85	0.64	1.40	0.14
Normal	12	21						
<i>Motor responses (best limb)</i>								
Flexion, extension or none	206	15	0.68	0.81	0.93	0.40	3.66	0.40
Obeying, localising or withdrawing	98	66						
<i>Deep tendon reflexes</i>								
Absent	67	4	0.24	0.95	0.94	0.26	4.67	0.80
Present	213	74						
<i>Skeletal muscle tone</i>								
Absent	120	8	0.44	0.89	0.94	0.30	3.98	0.63
Present	155	65						

*Not able to calculate exactly.

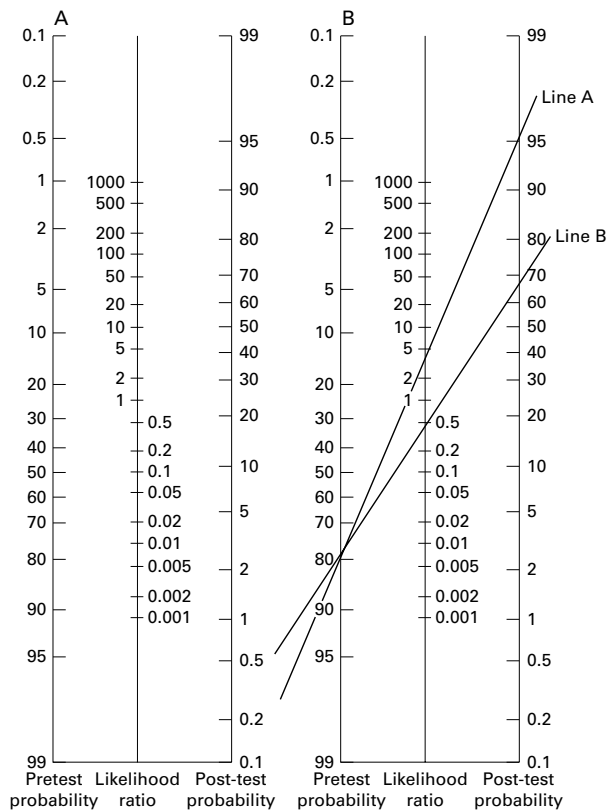


Figure 1 The likelihood ratio nomogram is a tool to show the effect of a test result on the pre-test probability. Reproduced from Sackett et al³ with permission of the publisher.

The likelihood ratio (shown in bold type) is a useful way to use these probabilities clinically. **The likelihood ratio of a positive test** indicates the effect of the worse neurological state while the **likelihood ratio of a negative test** indicates the effect of the better state on outcome.

Using the likelihood ratio nomogram³ shown in fig 1A the effect of a negative or positive test can be appreciated. From the population of patients admitted in coma examined at one day 79% have a poor outcome (305/385), so the pre-test probability for a poor outcome is 79%. The likelihood ratio indicates the effect of the different elements of clinical examination. If, for example, their best motor response is flexion or worse (likelihood ratio of positive test is 3.66), then using a straight edge on the nomogram the post-test probability of a poor outcome is about 95% (fig 1B, line A). If, however their best motor response is withdrawing or better (likelihood ratio of negative test is 0.4) the post-test probability of a poor outcome falls to about 60% (fig 1B, line B).

As the signs are not independent of one another the prognosis should be taken from the most informative sign rather than from combining the signs.

References

- 1 Levy DE, Bates D, Corona JJ, et al. Prognosis in non traumatic coma. *Ann Intern Med* 1981;**94**:293–301.
- 2 Jennett B, Bond M. Assessment of outcome after severe brain damage: a practical scale. *Lancet* 1975;i:480–4.
- 3 Sackett DL, Richardson WS, Rosenberg W, et al. *Evidence-based medicine. How to teach and practice EBM*. Churchill Livingstone, 1997.

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