

## APACHE II

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The APACHE II model was originally published in 1985 based on data from the US (Knaus et al, 1985). It has been recalibrated twice for use in the UK, first following the Intensive Care Society's APACHE II study in Britain and Ireland (Rowan, 1992; Rowan et al, 1993) and subsequently using data from the Case Mix Programme Database (Harrison et al, 2006). We regularly recalibrate the model using Case Mix Programme data to ensure that each critical care unit is being compared with current data. Coefficients from the most recent recalibration are used in the eDAR.

### Risk predictions in APACHE II are based on:

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- The APACHE II score – a score from 0 to 71 consisting of weights for age at admission to your unit (0 to 6 points) and severe conditions in the past medical history (0 to 5 points) plus an Acute Physiology Score (0 to 60 points) based on weightings for deviations from normal in the following twelve physiological parameters during the first 24 hours in the unit
  - temperature
  - mean arterial pressure
  - heart rate
  - respiratory rate
  - A-aDO<sub>2</sub> (if FiO<sub>2</sub> ≥ 0.5) or PaO<sub>2</sub> (if FiO<sub>2</sub> < 0.5)
  - arterial pH (or serum bicarbonate if no arterial blood gas recorded)
  - serum sodium
  - serum potassium
  - serum creatinine (with double weighting for acute renal failure)
  - haematocrit (estimated from haemoglobin)
  - white blood cell count
  - Glasgow Coma Score (assumed to be normal for patients sedated or paralysed and sedated for the whole of the first 24 hours in the unit, or for the entire stay if less than 24 hours)
- Admission directly from theatre following emergency surgery
- Diagnostic category (weightings for 58 non-surgical diagnoses and 50 surgical diagnoses, plus seven body systems, and a weighting for CPR within 24 hours prior to admission that overrides any other diagnostic category)

### Exclusions

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Admissions are excluded from the calculation of the APACHE II score if:

- a. age at admission to your unit is less than 16 years; or
- b. length of stay in your unit is less than 8 hours.

Additionally, admissions are excluded from the calculation of an APACHE II risk prediction if:

- c. the admission is for primary burns;
- d. the admission is following coronary artery bypass graft (CABG) surgery;
- e. the admission is transferred in from another ICU; or
- f. all twelve physiological variables are missing.

Readmissions of the same patient within the same hospital stay and admissions missing ultimate hospital outcome are excluded from comparisons of observed and expected mortality.

## References

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Knaus WA, Draper EA, Wagner DP, Zimmerman JE. APACHE II: a severity of disease classification system. *Crit Care Med* 1985; **13**:818–29.

Rowan KM. *Outcome comparisons of intensive care units in Great Britain and Ireland using the APACHE II method [DPhil thesis]*. Oxford: University of Oxford, 1992.

Rowan KM, Kerr JH, Major E, McPherson K, Short A, Vessey MP. Intensive Care Society's APACHE II study in Britain and Ireland-II: Outcome comparisons of intensive care units after adjustment for case mix by the American APACHE II method. *BMJ* 1993; **307**:977–81.

Harrison DA, Brady AR, Parry GJ, Carpenter JR, Rowan K. Recalibration of risk prediction models in a large multicenter cohort of admissions to adult, general critical care units in the United Kingdom. *Crit Care Med* 2006; **34**:1378–88.