What is the purpose of a risk model?

The purpose of a risk model is to use data from prior to/at the start of an intervention (in this case the intervention of the resuscitation team) to predict the likelihood of an outcome.

What do the NCAA risk models allow you to do?

NCAA risk models enable fair comparisons to be made between hospitals for the first time, whereby differences in the patient/event characteristics (e.g. age, presenting rhythm, etc.) that would be expected to result in differences in outcomes, are taken into account. Risk-adjusted comparative analyses are included in the quarterly cumulative NCAA Report provided to participating hospitals.

What are the outcomes predicted by the NCAA risk models?

The NCAA risk models predict two outcomes:

1) **ROSC greater than 20 minutes**; and
2) **survival to hospital discharge**.

Participating hospitals can compare predicted (i.e. expected) outcomes with the actual (i.e. observed) outcomes for their hospital, and against NCAA data. Hospitals can also compare their risk-adjusted outcomes against other participating hospitals (anonymised).

Which patient/event characteristics are used in the NCAA risk models?

The patient/event characteristics used in the NCAA risk models to predict outcomes are:

- Age in years
- Sex
- Length of stay in hospital prior to arrest
- Reason for admission to/attendance at/visit to hospital
- Location of arrest
- Presenting/first documented rhythm
- Patient deteriorating, not yet arrested, on team arrival (only used in the model for survival)
- Interactions between location of arrest and presenting/first documented rhythm (allowing for a different effect of presenting/first documented rhythm depending on the location of the arrest)

How were the NCAA risk models developed?

NCAA risk models were developed and published in 2014 (Harrison et al) and were subsequently recalibrated in 2018. The NCAA$_{2023}$ risk models are the latest recalibrations using data from 21,646 in-hospital cardiac arrests in 190 hospitals participating in NCAA between 1 April 2021 and 31 December 2022.

What data are included/excluded from NCAA risk models?

All patients meeting the scope of NCAA (any resuscitation event commencing in-hospital where an individual receives chest compression(s) and/or defibrillation and is attended by the hospital-based resuscitation team (or equivalent) in response to a 2222 call) are included in the NCAA risk models and risk-adjusted comparative analyses, except:

- team visits where the reason resuscitation stopped is recorded as 'Dead - DNACPR';
- team visits which are missing predictors or outcome data; and
- subsequent arrests of the same patient within the same hospital stay.

Reference

Harrison DA, Patel K, Nixon E, Soar J, Smith GB, Gwinnutt C, Nolan JP, Rowan KM on behalf of the National Cardiac Arrest Audit. Development and validation of risk models to predict outcomes following in-hospital cardiac arrest attended by a hospital-based resuscitation team. *Resuscitation* 2014; 85:993-1000. http://dx.doi.org/10.1016/j.resuscitation.2014.05.004.