

## Perioperative risk assessment

Perioperative risk assessment refers to estimating a patient's risk of adverse outcomes in the perioperative period.

### Why should patients be assessed for risk?

Risk assessment is a crucial component of shared decision-making; it helps patients and their families objectively understand the implications of undergoing surgery. It can be used in the absence or presence of functional capacity assessments, such as cardiorespiratory tests, to help patients make an informed decision about whether surgery is the best treatment option for them.

Risk assessment identifies the high-risk patient and provides an opportunity to develop strategies to mitigate risk, for example preoperative optimisation. It also helps determine, for example, whether consultant presence is required intraoperatively as well as the level of postoperative care that a patient is likely to require. This not only minimises perioperative risk but also guides resource allocation, which is especially important when critical care is a limited resource. In addition, risk assessment is useful as part of service evaluation, audit and research.

### How can risk be assessed?

Preoperative risk assessment tools can be sub-divided into risk scores and risk prediction models. Some of these estimate the risk of mortality, whereas others estimate the risk of adverse outcomes, such as the ARISCAT (Assess Respiratory Risk in Surgical Patients in Catalonia) score which predicts the risk of postoperative pulmonary complications.

Risk scores assign a weighting to factors identified as independent predictors of an outcome and score patients on a comparison scale. They are simple to use but do not provide an individualised risk prediction (Moonesinghe et al, 2013). Examples include:

- ASA-PS (American Society of Anaesthesiologists Physical Status)
- RCRI (Revised Cardiac Risk Index).

Risk prediction models calculate an individual's probability of risk by entering data into a multivariable model. They are generally more accurate than risk scores, but are more complex to use. Examples include:

- NELA (National Emergency Laparotomy Audit risk calculator)
- P-POSSUM (Portsmouth-Physiology and Operative Severity Score for the enUmeration of Mortality)
- SORT (Surgical Outcome Risk Tool)
- SRS (Surgical Risk Scale)
- ACS NSQIP (American College of Surgeons National Surgical Quality Improvement Program).

### How accurate are the various risk assessment tools?

Moonesinghe et al (2013) published a systematic review that looked at the performance of risk stratification tools in surgical patients. They found that many of the tools had only been validated in single studies; of the multiple-validated tools, P-POSSUM and SRS were the most consistently accurate.

The NELA risk calculator has since been developed using NELA data gathered between 2014 and 2016; this has been shown to be more accurate than P-POSSUM at estimating 30-day mortality for patients undergoing emergency laparotomy in the UK (Hare and Moonesinghe, 2017).

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A cohort study compared subjective clinical assessment of risk of mortality with SORT, P-POSSUM and SRS (Wong et al, 2020). The study concluded that SORT demonstrated the best discrimination of these three models, but also that subjective assessment was as accurate as SORT for predicting 30-day postoperative mortality. However, combining subjective assessment with SORT provided an even more accurate estimate. This has led to the development of the SORT-clinical judgment model (<http://www.sortsurgery.com/>), to replace the original SORT model (Wong et al, 2020).

## What are the limitations?

No risk assessment tool will ever be entirely accurate or reliable, and should always be used in conjunction with clinical judgement.

Many of the available models are time-consuming, not user-friendly, and require information that is not easy to access, subjectively assessed and/or estimated. Most of the models require access to a computer and/or the internet.

Many of the tools use mortality as their end point, which is not patient-centred; most patients focus on morbidity and the likelihood of returning to their preoperative function.

Many of the tools have only been validated for certain types of surgery in specific geographical areas, and therefore may not be generalisable to the patient being considered.

## Conclusions

While the perfect risk assessment tool does not exist, risk assessment should be a routine component of the perioperative management of patients in order to facilitate shared decision-making and aid the planning of patients' perioperative journeys.

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## References

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