

Is the SORT score reliable in predicting postoperative 30-day mortality after a nonemergency surgery in Saudi population?

ABSTRACT

Context: The process of stratifying patient risk preoperatively helps in the decision about the best-possible postoperative care for patients. There have been many scoring systems that are used in anesthesia practice.

Aims: To find out whether there is any difference between the mortality predicted from SORT scoring and the observed mortality among Saudi patients.

Settings and Design: This was a prospective, observational study in which we included patients undergoing nonemergency surgical procedures at the Security Forces Hospital, Riyadh.

Methods and Material: We calculated the SORT scores for all the included patients. We then collected the 30-day mortality data of all the patients having nonemergency surgical procedures.

Statistical Analysis Used: We calculated the expected mortality ratio. A *P* value of less than 0.05 was considered significant.

Results: The mean SORT mortality risk score (%) for the whole sample was 0.30. The expected number of deaths was 1.638 while the observed deaths were 2, which yields an O/E ratio of 0.819 (*p*-value: 0.006). The O/E mortality ratios for patients in each individual ASA class were found to be statistically insignificant which means that SORT score can reliably predict mortality for each ASA class.

Conclusions: SORT scores can be used to predict 30-day mortality after nonemergency surgeries in Saudi population.

Key words: Mortality; NCEPOD; nonemergency surgery; postoperative; risk stratification; SORT score

Introduction


Permanent disability or death from surgical procedures ranges from 1 to 3.6% in developed countries. The high-risk group patients contribute mainly to these perioperative deaths. Therefore, it is very important to stratify patient risk preoperatively and hence decide the best-possible postoperative care for the respective patients.^[1]

A postoperative adverse outcome cannot be reliably predicted by clinical judgment alone.^[1] There have been many preoperative risk assessment tools^[2] developed to help identify high-risk patients that complement investigations like cardiopulmonary exercise testing^[3,4] and biomarker assays.^[5] However, exercise testing facilities are not available routinely,^[6] and are also inappropriate in relatively urgent

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surgical patients. Some of these risk-assessment tools or scoring systems include the Surgical Apgar Score,^[7] APACHE II,^[8] ASA,^[9] P-POSSUM,^[10] and SORT.^[11] The primary purpose of these scoring systems is to reliably predict the patient risk preoperatively and hence decide the best treatment available for patients.^[10]

In United Kingdom, the NCEPOD 2011 study on perioperative care (“Knowing the risk”),^[6] recommended the need to rapidly and easily identify high-risk patients. Another recommendation was that a preoperative mortality risk assessment should be made explicit to all surgical patients and to be documented in patient-consent forms. Based on the data from that study, a preoperative assessment tool called SORT (Surgical Outcome Risk Tool) was developed and internally validated. A SORT score consists of six preoperative variables including type, severity and urgency of surgical procedure, ASA status, age, and presence or absence of cancer in the patient. The SORT score can predict the 30-day mortality risk in patients undergoing noncardiac and nonneurological surgeries.^[11] Protopapa *et al.* compared SORT against the ASA scoring system and a modified version of SRS (Surgical risk score) and found it to be more reliable than either of the two scores.^[11]

It is also necessary to externally validate SORT along with recalibration and reevaluation of the model to maintain its validity with changing healthcare delivery.^[12] The objective of this study is to find out whether there is any difference between mortality predicted from the SORT score and the observed mortality in Saudi patients having nonemergency surgery.

Subjects and Methods

We got the Institutional Ethical Review Committee (ERC) approval (H-01-R-069) for this prospective observational study that was conducted at the Security Forces Hospital, Riyadh, Kingdom of Saudi Arabia. A written informed consent was not needed as agreed with the ERC. First, we collected hospital data of patients undergoing nonemergency surgery from July to November 2019. Pediatric patients (aged less than 18 years) were excluded from this study and SORT score was calculated for all eligible patients. We then collected the mortality data from the hospital monthly mortality reports. Patient outcome was also followed using hospital online patient records.

Data was entered in Microsoft Excel and analyzed using SPSS version 21.0. A descriptive analysis was carried out. Mean with standard deviations and frequencies was calculated for the continuous and categorical variables, respectively.

The SORT score for mortality of all the participants was calculated using the scoring system. The expected number of mortalities was calculated by multiplying the mean risk score of each group with the number of patients in that group. The observed to expected number of mortalities ratio was calculated, in which a value of 1 would represent the best prediction. A Binomial test was conducted to assess the difference between the expected and observed number of mortalities. A *P* value of less than 0.05 was considered significant.

Results

A total of 546 patients who underwent nonemergency surgical procedures were included in the analysis. The mean age of the participants was 44.43 (± 16.3) years and 68.7% (254) were male. A majority of the patients belonged to ASA class II (53.8%), followed by class I (26.6%). Classes III and IV comprised 18.5% and 1.1%, respectively. Most of the patients underwent general surgery (30.6%) followed by orthopaedics (23.1%) and urology (22.5%). Other specialities include plastic (11.4%), vascular (3.5%), spinal surgery (3.5%), fasciomaxillary (2.2%), thoracic (1.3%), gynecology (0.9%), and ENT (0.9%) surgeries.

The mean SORT mortality risk score (%) of the whole sample was 0.30. The expected number of deaths was 1.638, while the observed deaths were 2, which yields an O/E ratio of 0.819 (*p*-value: 0.006) as shown in Table 1. Both these cases of mortalities were classed as ASA 3 preoperatively. One of them was an orthopedic case and other one was urology. The O/E mortality ratio for patients with ASA Class 3 was 0.425. The O/E mortality ratios for patients in each individual ASA class were found to be statistically insignificant [Table 1], which means that SORT score can reliably predict mortality for each ASA class.

Discussion

A routine process of risk stratification has some usual barriers which include collection of data and its entry and intraoperative and postoperative variables and the inability to calculate the mortality risk percentage of an individual.^[13,14] The ASA (American society of anaesthesiologist) scoring system is the most widely used preoperative assessment tool because of its simplicity and easy applicability.^[9] However, it does not account for intraoperative and postoperative adverse events or complications and the anesthesia and surgical management of patients. Usually, the ASA score has been questioned due to its subjectivity and inability to accurately predict mortality on individual basis.^[15] Therefore, SORT can become a more widely used score if we address these issues and develop an app and web-based calculator.^[13,14] Another advantage of using the SORT score is

Table 1: Comparison of expected and observed mortalities with respect to ASA class

ASA class	Number of patients	Mean risk score %	Expected number of mortalities	Observed number of mortalities	O/E ratio	P
1	145	0.1	0.145	0	0	0.865
2	294	0.14	0.411	0	0	0.308
3	101	0.85	0.85	2	0.425	0.212
4	6	3.64	21.84	0	0	0.228
Overall	546	0.30	1.638	2	0.819	0.006

Mean risk score is presented as percent (%). O/E ratio: Observed to expected mortality ratio. $P < 0.05$ considered statistically significant

that the variables that are needed for scoring are all known preoperatively, despite the fact that laboratory variables may not yet be known. That is why the SORT score is considered simpler and more practical to be used for mortality/morbidity risk prediction as compared to P-POSSUM.^[16]

In one study by Kehlet *et al.*, they compared SORT against NHFS (Nottingham Hip Fracture Score) and found equivalent discrimination and better calibration. Therefore, they concluded that SORT is better used as a preoperative risk assessment tool for a heterogeneous group of surgical patients rather than surgery-specific case mixes.^[17]

Although SORT was developed as a preoperative risk-assessment tool, it may also be valid as a risk-adjustment tool and hence could be a research priority providing an opportunity to improve the outcomes.^[18] In our study, the O/E ratio was 0.819 which is quite close to the value of “1”. However upon applying the binomial, the SORT score could not reliably predict the 30-day mortality, although it could reliably predict mortality if we apply the binomials for each individual ASA class. This could be because of the less number of mortalities compared to the total number of cases in our study. Therefore, a study with a relatively larger sample size could more reliably provide us its predictability.

In conclusion, SORT score can be used to predict the 30-day mortality after nonemergency surgeries among Saudi population. We recommend future studies with a larger sample size.

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Conflicts of interest

There are no conflicts of interest.

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