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Validation of a computerised system to calculate the sequential organ failure assessment score

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Dear Editor,

The sequential organ failure assessment (SOFA) score is a commonly used severity score [1]. It can be used daily as well as on admission [2]. Previous trials have suggested creation and validation of an electronic method of assessing severity scores [2]. We have designed and validated a method of creating a computerised SOFA score.

The local research ethics committee accepted that ethical approval was not required.

Fifty patients were selected by using a stratified sampling system. Data from 1 day on the ward (chosen at random) for each patient were included in the final sample.

A computer score was calculated as follows: raw data from the Innovian^{TM} system were extracted, cleaned and processed into holding tables in a reports database. To generate SOFA scores a series of SQL queries, updates, inserts and stored procedures interrogated the sample data to produce a final output for viewing and analysis.

A physician score was calculated; two intensivists independently calculated a SOFA score for each set of data using electronic records. The time taken to generate these scores was determined in blocks of 10 with a stopwatch. The two physicians reviewed the raw data, with their individual scores, to determine an integrated score.

Areas of difference were identified between the integrated human score and the computer score and were reviewed independently by an experienced ICU physician. The independent unblinded reviewer determined the correct score and the cause for the error was identified.

The groups were tested for normality and their correlation tested by using Pearson correlation coefficients. SPSS was used for all data.

A mean time of 4.9 min per patient was required for physician scoring. The computer processes the raw data from the Innovian system at a speed of 8 s per patient and can then generate 169 SOFA scores per second. No manual input of data is required for the computer-generated score.

SOFA scores were all normally distributed, allowing us to do the full range of parametric analysis. The mean SOFA score was 8.1 and the standard deviation was 2.9. The computer was more accurate with than either doctor and was similar to that of the integrated score.

Several recurrent errors were noted. The physician errors included poor arithmetic, misinterpretation of the rules and incorrect data identification. Common errors were seen in the respiratory component as a mathematical calculation of each individual P/F ratio had to be done. The computer errors included venous blood gases labelled as arterial, oxygen percentage mislabelled in litres/minute and pre-sedation GCS recorded as text. We have subsequently rewritten the query to eliminate these errors

This trial has shown that a computerised scoring system based on rules can be more accurate and rapid than that performed by a physician.

Using our eSOFA score we are now able to deliver daily SOFA scores on each patient to the multidisciplinary team prior to the morning ward round. The total unit SOFA is a good indicator of the acuity of the unit and the individual scores assist in the organization of nursing allocation.

References

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