



Comparison of a clinical score with individual clinician judgement for assigning priority for heart valve surgery

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Abstract

Background: Priority for cardiac surgery is usually based on a clinician's judgment of the degree of urgency. Point systems have the potential to improve the accuracy and consistency of this assessment. A working group of New Zealand Cardiologists and Cardiac Surgeons developed a Clinical Priority Score (CPS) for assigning priority for surgery for heart valve disease based on current guidelines of the AHA/ACC and ESC. Categories scored include the severity of the valve lesion, symptoms related to the valve lesion, the presence and amount of cardiac dysfunction, risk of progression and the presence of an additional AHA/ACC/ESC class 1 indication for surgery. Clear definitions relevant to individual valve lesions were used within each category. Points were assigned using decision analysis software which calculates weights based on the consensus 'expert' responses to a series of choices. The aim of this study was to compare the CPS with individual clinician judgment for assigning priority for heart valve surgery.

Methods: 25 vignettes of cases referred for a broad range of heart valve surgery were independently ranked for urgency by 8 cardiologists or cardiac surgeons. A clinical consensus rank (1 to 25) was then agreed by first determining the average rank then re-ranking cases after group discussion. The final consensus rank was compared to the rank assigned from the CPS and with the initial rank of each clinician.

Results: There was a close correlation between the CPS score and final consensus judgment ($r=0.91$), which on average was better than for individual clinicians (mean $r=0.74$, SD 0.13). For CPS and individual clinicians respectively the proportion of cases where agreement was very good (≤ 2 rank places different) was 60% and 37%, good (2.5 to 4) 24% and 28%, modest (4 to 8) 16% and 25%, and poor (>8 rank places different) 0% and 14.5%, $p=0.008$.

Conclusion: Priority for surgery for heart valve disease assigned by a systematic point score was consistent with consensus clinical judgment. In contrast individual clinician judgment was variable and more likely to assign a priority inconsistent with the consensus judgment.

Background

In many health services demand for cardiac surgery may exceed supply and decisions on which patients should have surgery soon and when it can be delayed, need to be made. These decisions are usually based on clinical judgement but differences in clinical opinion may result in inconsistency. The alternative is to use a point system which has the potential for greater transparency, consistency and fairness.

Development and evaluation of a novel point system for allocating priority for the urgency of surgery for heart valve disease is described.

Methods

Creation of point score

The categories used for the point score are based on the clinical practice guidelines for management of heart valve disease of the AHA/ACC¹ and ESC.² A common scoring system is used for all valve lesions. In the case of multiple valve lesions the combined effect of the valve lesion is used to estimate severity. To stratify urgency a more graded scale of symptoms, disease severity and cardiac dysfunction than defined in the AHA/ACC¹ and ESC guidelines² were used.

Methods

Assigning point values

Novel software (1000Minds)³ was used to assign point values. Clinicians are asked by 1000Minds to answer a series of questions designed to reveal preferences concerning the relative importance of different criteria. Each question presents a pair of hypothetical patients, defined on two criteria at a time and involving a trade-off between them.

Which patient should have surgery first assuming all other variables are equal?

| <i>this patient</i> | <i>they are =</i> | <i>this patient</i> |
|--|-------------------|------------------------------------|
| <u>Valve severity</u> is moderate | | <u>Valve severity</u> is severe |
| <u>Symptoms</u> are moderately limiting | | <u>Symptoms</u> none |

Six cardiologists and two cardiac surgeons used an electronic response tool to independently vote on who should be treated first. If the vote was not unanimous a majority decision was made after discussion. Consistency was checked by answering some questions a second time. The 1000Minds software calculated point values based on responses to multiple questions using a type of conjoint regression analysis known by the acronym PAPRIKA (Potentially All Pairwise Rankings of all possible Alternatives).

Clinical priority score to grade urgency of heart valve surgery

| Category | Grade | Description | Points |
|---|-------------|--|--------|
| Severity of valve lesion | Moderate | Does not meet criteria for severe valve lesion. | 0 |
| | Severe | Meets AHA/ACC/ESC criteria for a severe valve lesion. | 11 |
| | Very severe | Exceeds criteria for severe valve lesion. See valve specific definitions. | 17 |
| Symptoms related to the valve disease | None | No symptoms related to valve disease. | 0 |
| | Mild | Symptoms related to valve disease are present but do not restrict most ordinary activity. | 11 |
| | Moderate | Symptoms related to valve disease. Restrict ordinary activity. | 17 |
| Cardiac Dysfunction | None | Normal cardiac function. | 0 |
| | Early | Early cardiac dysfunction but AHA/ACC/ESC criteria for intervention are not met. See valve specific definitions. | 4 |
| | Moderate | AHA/ACC/ESC criteria for intervention because of cardiac dysfunction are met | 11 |
| Disease Progression | Stable | LVEF $<40\%$ or degree of cardiac dysfunction exceeds AHA/ACC/ESC criteria by $>30\%$ and is potentially reversible | 24 |
| | Progressive | $>15\%$ deterioration in 2 clinically relevant measures for valve severity or cardiac dysfunction over <1 year or presence of a valve lesion with a higher risk of progression | 2 |
| Additional AHA/ACC/ESC class 1 indication for surgery | No | | 0 |
| | Yes | Another AHA/ACC or ESC class 1 or 2a indication for surgery, for example severe coronary artery disease or ascending aortic aneurysm. | 13 |

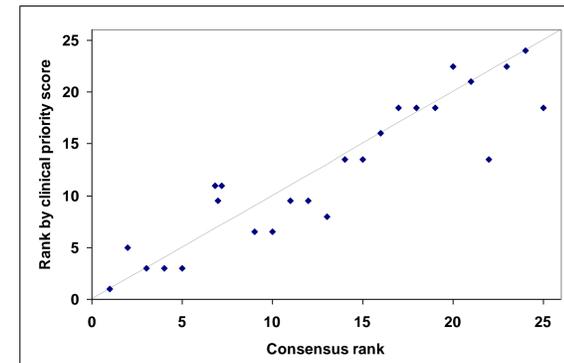
Evaluation of point score

Testing on case vignettes

Twenty five case vignettes representative of the broad range of patients referred for urgent or elective heart valve surgery were evaluated. Clinicians using clinical judgement independently ranked cases on the urgency for surgery from 1 to 25. The vignettes were then discussed by the group and a 'consensus rank' agreed. Each case vignette was also scored using the CPS by two cardiologists who were blind to the consensus clinical ranking. The 'consensus rank' served as the 'gold standard'.

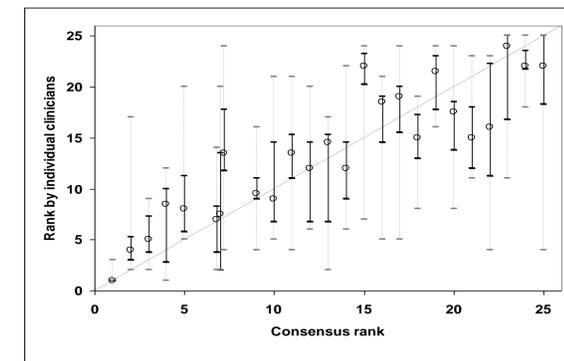
Results

Priority rank for urgency of surgery assigned by consensus clinical judgement is compared to the clinical priority score (CPS)



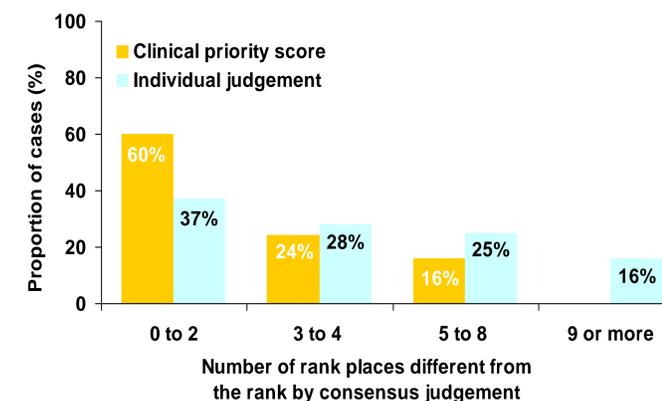
The 25 cases are plotted on the x-axis in rank order based on consensus clinical judgement, and on the y-axis by the rank based on the clinical priority score (CPS) ($r=0.91$, $P<0.0001$).

Priority rank for urgency of surgery assigned by consensus and individual clinician judgement



The median, inter-quartile range (solid lines) and range (dashed lines) of rank assigned by the 8 individual clinicians is plotted against the consensus rank ($r=0.72$, $P<0.0001$).

Agreement between the different methods for assigning priority for heart valve surgery



Limitations

The point score does not evaluate all clinical scenarios (e.g. bacterial endocarditis, prosthetic valve malfunction) and should be used to guide not replace clinical judgement.

Evidence regarding the relative importance of different measures of disease severity and cardiac dysfunction for different valve lesions was often limited. As with other guidelines the point score will need revision after audit and when new evidence becomes available.

Discussion

The 1000MINDS software reduces a complex decision influenced by many variables to a series of simple trade-offs which consider only two variables at a time. Making a choice from two, assuming all else is equal, is easier than a decision in which multiple variables must be considered simultaneously.

The priority score provided a priority rank which was consistent with that made by a consensus of clinicians who evaluated case vignettes using judgement alone in the usual way. Responses to certain dilemmas are likely to differ by local practice and interpretation of evidence.

Conclusion

A novel method for creating a simple point score for assigning priority for heart valve surgery is described.

Use of point scores may enable fairer allocation of limited resources, provide greater transparency to clinical decision making and improve understanding of reasons for differences in practice between clinicians and institutions.

References

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