Reviewer's report

Title: A regret theory approach to decision curve analysis

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Reviewer: Elizabeth Krupinski

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BMC Medical Informatics and Decision Making: Regret Theory

Overall: This is an interesting paper on the incorporation of regret theory into decision curve analysis. The paper is written in a very clear manner and over the ideas presented are logical and supported by the associated math. The math itself seems appropriate and correct throughout. There are just a few points of clarification required.

Abstract: Fine as written.

Introduction: Fine as written. It does a good job of describing the general decision making theory upon which the current procedure is based and what the current procedures lack in terms of usefulness and general acceptability/use by actual clinicians.

Methods: A couple points require clarification.

1) Minor: Page 6 para 2 line 1: This is not a sentence.

2) Major: Page 7 para 3 line 2: A question that arises is how does one define the harm incurred, especially if the harm is more psychological than physical and from who’s point of view? In other words – if a man receives a prostate biopsy for a benign condition, the physician may have regret because of the fact that an “unnecessary” biopsy was done for a benign condition. The patient on the other hand may recognize that harm plus the additional physical trauma of the biopsy and the psychological trauma of having thought he might have cancer (the period between hearing there might be cancer and the time to get the pathology report back). Clearly the harm incurred is more for the patient than the physician so which harm value is used in the model and under what circumstances? Would you generate a model for each circumstance and if so what good is that as the outcomes are going to be different? Or are you expecting the physician to somehow take into account and properly weight the harm incurred from the patient’s perspective?

3) Major: Page 10 & page 20 para 1: It is not clear when these types of questions would be asked to elicit the threshold probabilities. It is not clear that there would actually be a single threshold for each decision type (biopsy, no biopsy). It seems likely that this threshold would change for every patient & situation to some extent – no? If so does this mean the physician has to input the answers to the questions every time they want to use the model as a decision aid?
Results: Nicely summarize in the tables & figures.

1) Major: Table 1: Given this scenario it is clear from the end (step 5) that the clinicians have very different thresholds and thus would come to very different recommendations to the patient. The broader question in a sense becomes – if there is so much user variability does the model have any significance beyond the individual user trying to balance their decisions & regrets? Clearly the impact on a given patient would differ if they went to physician #1 vs #2 so how does this help improve patient outcomes especially in the sense of reducing variability and errors in decisions?

Conclusions: Some of the points raised above may be better addressed here rather than in the previous paper sections.

1) Major: Need to discuss the limitations of the approach.
2) Minor: Should discuss how you actually foresee clinicians using your model in real life.

References: Fine.

Tables & Figures: Fine.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare that I have no competing interests