Responses to Reviews for Measuring the Price of Anarchy in Critical Care Unit Interactions

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Below we respond to each reviewer in detail.

0.1 Reviewer 1

Write the clarifications of notations $\lambda_h^{(l,h)}, \lambda_h^{(l,l)}$. One $h \in (NH, RG)$ other h denotes RG experiences high demand.

Give explanation for figure 3.

Write clearly major contribution of the paper corresponding to the existing literature.

State clearly the objectives of the model.

0.2 Reviewer 2

On page 5, the model is referred to as a Figure 6. This confuses and leaves a question on whether it is a figure or equations. I am unsure whether figure 6 is missing or authors are referring to the model on page 6.

The paper is unreadable. The unknowns used, some, are undefined, for example on page 3, h, ch, etc are not defined and it is very difficult to find definitions of those defined. I suggest that the authors provide a list of the parameters used somewhere in the paper where it is easy to refer.

On page 12, authors states that "It is also noted that as demand increases the effect of uncoordinated behaviour increases (and the recommended target also increases) as shown in Figure 13", is there any possible explanation to this finding.

Are the Queuing and Game theoretic models never been implemented to solve such problems? There is a need to review literature that has information on application of the used models to hospital problems or related problems.

The authors need to give a justification on the reason why they are implementing the models.

0.3 Reviewer 3

I recommend that the authors write a more complete and coherent Discussion and/or Conclusion which places their work in the context of the critcal care system. It should relate model limitations to the critical care system. The current way that limitations are discussed is too technical. A brief discussion of stakeholder feedback would also be useful.

At the beginning of Section 3.1, the authors claim that if neither CCU is able to admit patients, then admission to the CCU is cancelled and the patient is admitted to a general ward. In my experience modelling CCUs, it is highly unlikely that a critical patient would ever be admitted to a general ward. CCU beds are almost always equipped with ventilators and ward beds never. I believe that more likely courses of action are:

- *Sending the patient to another hospital's CCU. This would be a CCU outside of the model.*
- *"Bumping" a patient currently in the CCU to a ward bed, to free up a bed. This would normally be a patient who was nearly ready to be transferred to the ward anyway.*
- *Accommodating the patient in the hospital's post-anesthesia care unit (PACU), which sometimes functions as an overflow for the CCU.*

I recommend that the authors consult with their stakeholders and correct this comment in their paper, if necessary. This wouldn't have any impact on their model, but it is important to use the correct language.

The axis labels on many of the graphs are in a very small font. The font size should be increased.

The optimisation problem is shown as a figure (Figure 6). I suggest that this be separated from the text with a header such as "Optimisation Problem" (much like a theorem). Calling it a figure seems like a misnomer, and for me, actually made it harder to find.

In Figure 7, the caption should state which points are $f_N H$ and which are $F_R G$.

I was puzzled as to whether the target, t, appeared in the definition of T^*. As I understand it, T^* is independent of t. Is this true? Also, for which values of $K_N H$ and $K_R G$ is the maximum achieved? Is my intuition correct that it is achieved at $K_N H = c_N H$ and $K_R G = c_R G$?

The authors make extensive use of bullets in the text. While bullets can be useful to draw attention to key points, they can lead to lazy writing. In my view, converting some of the bullet lists would improve the clarity of the exposition.