Dear Reviewers,

To facilitate peer-review and reproducibility of our research, we are sharing the codes underlying our analysis. This document is a brief instruction on how to use the code.

The codes for the analyses are provided in the Github repository, under the paperCode folder, accessible from https://github.com/msadatsafavi/mROC/tree/master/paperCode

Please note that the code requires the mROC R package to be installed. The instructions are provided on the package's homepage pon Github: https://github.com/msadatsafavi/mROC

Once the package was installed, please source the mROC.paperCode.R file in the paperCode folder. Note that some of the functions will require dependency packagaes (pROC, gsubfn, proto, RSQLite, sqldf)

1. R code for the stylized example for Supplementary Material – Section 1 (marked as section 1 in the code):

   ```
   stylized_example()
   ```

2. R code for the stylized example under (**The connection between mROC curve, case-mix, and model calibration,** and Figure 1; marked as section 2 – stylized simulation in the code):

   ```
   stylized_simulation()
   ```

3. R code for the simulation studies (marked as section 3 – detailed simulations in the code)

- The first set of simulations (reported in Supplementary Material – section 3) can be run by calling the following function:

  ```
  detailed_sim_linear()
  ```

*Note that the above function takes several argument, but the results that are reported are based on default argument values. Importantly, the coefficients a and b, as described in the text, are represented by, respectively, b0 and b1 in the arguments. Also, the population calibration and ROC plots can be generated by calling the function with `draw_plots='pp'` and `draw_plots='roc'`, respectively.

- The second set of simulations (reported in the main text and Figure 2, 3, and 4) can be run by calling the following function:

```
detailed_sim_power()
```

*Note that the above function takes several argument, but the results that are reported are based on default argument values. Importantly, the coefficients a and b, as described in the text, are represented by, respectively, b0 and b1 in the arguments. Also, the population calibration and ROC plots can be generated by calling the function with `draw_plots='pp'` and `draw_plots='roc'`, respectively.

4. R code for the case study (section titled 'Application' in the main text, and Figure 5 – marked as section 4: case study in the code).

- When all exacerbations are the outcome:

```
case_study()
```

- When severe exacerbations are the outcome:

```
case_study(only_severe=TRUE)
```