AI-driven identification of onco-hematology and lung cancer patients who may develop severe COVID-19


1 Aim & Contribution of the Study
The widespread implementation of COVID-19 vaccines achieved a great success in the general population. However, an urgent medical need exists for onco-hematological and other immunocompromised patients for whom vaccines may not provide optimal protection. Identifying these patients may help consider additional layers of protection, including passive immunization with monoclonal antibodies, has been a challenge. Herein, we propose an artificial intelligence (AI) driven methodology to aid the identification of patients at risk of severe COVID-19 via a minimal number of variables.

2 Methods
We sought to identify the minimal set of independent variables (signatures) characterizing COVID-19 infected populations, and to determine the best AI solution using these signatures to predict the severity of infection via an end-to-end integration of statistical importance and AI methods.

Flow diagram depicting AI workflow

3 Results
Using the training cohort, we identified 7 variables enabling the prediction of moderate/severe cases with a balanced accuracy of 71% and 75% and AUCs of 0.76 and 0.72 for the internal testing and external validation cohorts, respectively. Most importantly the model reached an 85% performance on the severe cases on the external validation cohort.

4 Conclusion
The conducted analysis leads to promising insights towards identifying onco-hematological patients who are most vulnerable to develop severe COVID-19. This may help to offer additional prevention strategies to protect them from COVID-19 infection and can potentially be further extended to other immunocompromised populations. Clinical use of the presented model can help minimize severe COVID-19 infections and maximize the success of onco-hematological and lung cancer treatments by avoiding COVID-19 related interruptions, simplify decision making to 7 variables and generating scientific content to support healthcare professionals education. Ultimately, it promises to help reduce the hospitalization burdens and help payors identify highest reimbursement value.

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