

Peer Review File

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Reviewer A

Very interesting paper.

English is correct as well under the statistical and methodological point of view.

I do not agree with the concept expressed regarding computer replacing human work. My advice is to re-elaborate lines 288-289.

Response:

In this study, the LungCTAnalyzer module uses a nnU-Net TotalSegmentator AI tool (11), which enables autonomous computer analysis including lung lobes without human intervention, however our results clearly show that a gold standard has not yet been defined

Moreover I do not agree with what expressed in lines 345-350.

If we have different evaluations from two expert radiologists, I do not think that automated computer evaluation will be able to mitigate these different opinions.

I think that if we let a computer "read" a CT there will be the risk of a more "superficial" evaluation.

Response:

, but it is questionable if a computer program will ever be able to mitigate these different opinions.

I think that if we let a computer "read" a CT there may also be the risk of a more "superficial" evaluation.

More strength should be given to the concept that AI can be a useful adjunct, not a substitute, to humans.

Response: but we are aware of the fact that computer software will probably be an adjunct not a substitute to humans.

Reviewer B

The paper is written in a good format.

All the sections are described very well. Information provided for the dataset, hardware, software and training is sufficient.

Reviewer C

Very important subject on the utility of AI CT analyzer in classifying patients and determining their lung involvement in COVID-19. Interesting research on a new 3D Slicer-based LungCT Analyzer, which may be a promising tool for future research and clinical practice. The side of this informatics work is very interesting and important. Even though, the same results of the lung involvement pattern are already well -known, it's important to validate AI systems with radiological scoring. This is the most valuable impact of this research.

I would be however less sure of the possibilities of the system to forecast ICU hospitalization and would suggest to reformulate the title (has been changed) and conclusions (have been changed).

As the authors mention in one of the limitations of the study, the necessity of ICU hospitalization is multi-factoriel and not only dependent on CT lung involvement.

Response: Agreed

I would also suggest to introduce, describe and refer to the chosen CT score classification, why did the authors choose this specific one with ranges 0-5?

I agree with the authors, that the study sample size is relatively small, which may limit the generalization of the authors' findings and is an important limitation of the study.

Response: Agreed

Added: but it is also clear that the necessity of ICU hospitalization is multi-factoriel and not only dependent on CT lung involvement.

Other small issues:

-Concerning Fig.5: Where is the * showing on the Figure which difference is statistically important? Please, include it."

Response: added

-Some minor English mistakes like for example in line 331 "which may limit the generalizability of our findings", the authors meant I suppose "possible generalization"?

Response: agreed.

Changed to possible generalization

Reviewer D

(General Comment)

1. I am grateful to be asked to review this manuscript addressing AI-driven quantitative chest CT analysis forecasts ICU requirements in 78 COVID-19 cases.
2. The paper provides very interesting data but it still needs a considerable revision to be acceptable for JTD.
3. Overall, I would suggest extensive revision in combination with re-review for this manuscript.

(Minor comment)

1. 97-98. First and second periods overlap. Please state correctly.

Similarly, have authors identified the strains that were prevalent during these periods?

111. Isn't atypical pneumonia relevant in this paper?

Thank you for taking the time to review our manuscript and for providing constructive feedback. We appreciate the opportunity to improve the quality of our work.

Please understand that we were working on a very early Italian dataset in which COVID-survival was the main and crucial primary outcome.

The data collection was limited to storing the CT volumes with only very basic clinical data, so this is not a prospective study

We discovered the material a year later after it was published as the first open-source COVID lung CT dataset along with visual classifications of the infiltration. The score was not invented by us.

We simultaneously developed Lung CT Analyzer applied it to the data (much later) and found a good clinical correlation between the human observations as well as the rate of patients who required ICU therapy.

A few patients with clear chronic or acute bacterial lung disease were excluded (see text) .

The main point we want to bring over to the readers:

Computerized Lung CT Analysis can now evaluate and quantify COVID infiltrated in a magnitude of minutes or even semiautomatically before the Radiologists has even pictures on his screen.

(Major comment)

1. It should be stated when the chest CT analysis with the LungCTAnalyzer was performed during hospitalization.

It was done a year after hospitalization

2. What was the average time to ICU admission from the final analysis by LungCTAnalyzer?

LCTA was not used in therapeutic intent in that study.

If patients are to be transported to the ICU, the sooner they are detected, the better.

We agree.

3. Did the patient originally complicate with chronic lung diseases? If so, does it affect the analysis by AI? Patients admitted to the ICU are often complicated with chronic lung diseases.

We agree that patients with chronic lung disease were probably present in the study, but the patients originally complicated with respiratory dysfunction due to COVID infiltrations.

4. How many patients were complicated by chronic lung disease (COPD, interstitial lung disease, bronchiectasis) should be stated in the Table or in the text.

We have added information on signs for additional lung diseases in the paper.

5. Were all 78 patients free of complications of bacterial pneumonia? This would affect the analysis of chest CT by AI.

We do not have any data on that important question.