

An Artificial Intelligence Enabled  
Tool to Diagnose Covid-19 from  
Chest X-ray (CXR)

# AA+ COVID-19 Testing Solution

*Powered by Deepiotics*



Supported by  
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***"To provide the easy, affordable, scalable and rapid testing solution for COVID-19 for individual and the health care entities."***

## Executive Summary

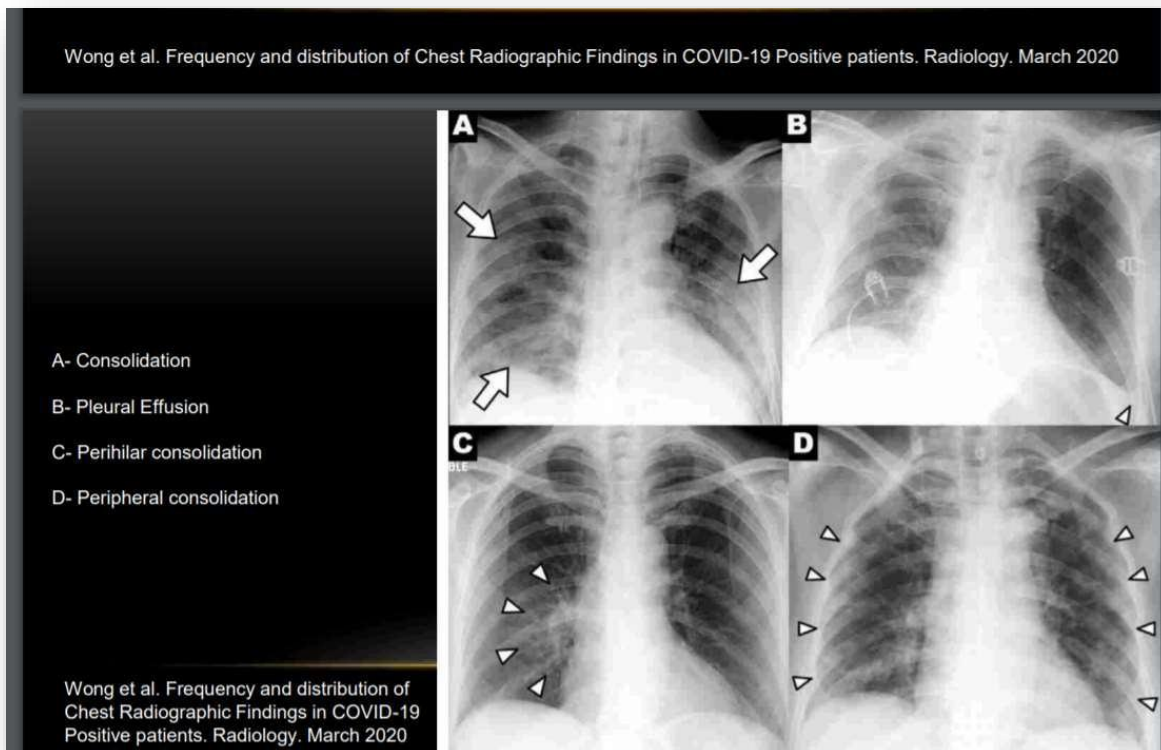
We at ESDS help healthcare and other sectors with the cutting edge Artificial Intelligence and Deep Learning technology to solve the enormous problems faced in the industry.

With the help of the experts in the medical field, we have developed a technological solution to identify the COVID-19 patients. Our Deep Learning and advanced AI-driven platform uses the conventional x-ray platform that helps to identify corona infection from Chest x-ray within 5 minutes. With the help of the available samples, we can meet the accuracy level of 100%. However, we believe that our technology would stand at least accuracy of 96%. As we get more samples of the patient over a period of time, the efficiency of platform will increase to 99.50% -100% permanently.

This process of adopting the conventional method along with the integration of AI & Deep Learning, we believe, we can solve the common problem associated with the current slow and sluggish process of testing in both rural and urban areas.

## The AI Based Solution for Covid-19 detection

We are team of radiologist and technology specialists, we have established the COVID-19 suspect detection method through traditional x-rays using AI.



Frequency and distribution of Chest Radiographic Findings in COVID 19

## Role of CXR in Covid-19 finding:

CXR can be used for assessing disease progression/severity.

## Symptom:

- Bilateral consolidation/ground glass opacities

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- Peripheral and lower lobe predominance

## Evaluation of the algorithm:

We have used Area under Receiver Operating Characteristic Curve (AUC) along with Sensitivity and Specificity at the operating point to evaluate the performance of our algorithm. We validated it on a test set of 6730 CXRs with 2972 confirmed COVID-19 positives.

To detect signs of COVID-19, we have observed an AUC on this test set. We observed the sensitivity to be 0.955 and specificity to be .762. While there are no WHO guidelines yet for an imaging based triage

Tool for COVID, WHO recommends a minimum sensitivity and specificity of 0.9 and 0.7 for community screening tests for Tuberculosis [1], which is a deadly infectious disease in itself.

### Sensitivity:

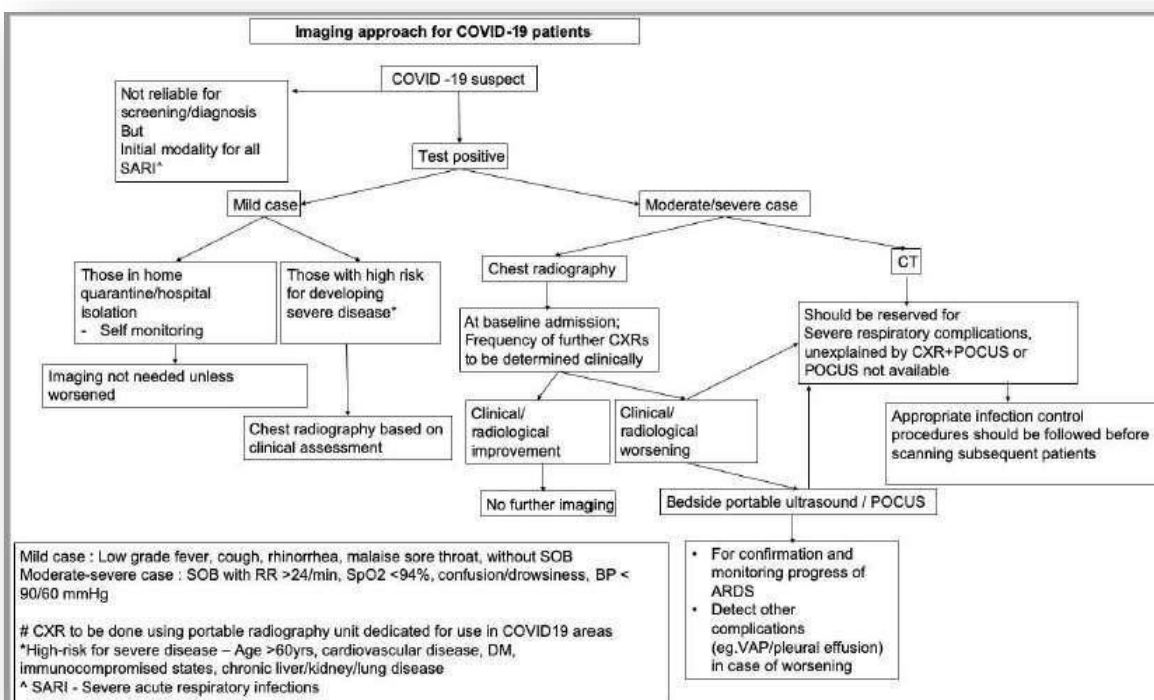
Sensitivity is the probability that a test will indicate 'disease' among those with the disease: **.955**

### Specificity:

Specificity is the fraction of those without disease who will have a negative test result: **.762**

Positive Predictive Value: **.760** & Negative Predictive Value: **.956**

## ICRI Guidelines for CXR:



Covid19 Imaging Recommendation by Indian Radiological and Imaging Association (IRIA) [2]

## AA+ Covid-19 Testing Solution Benefits:

1. Tool is helpful where PCR-Testing kits are less in number.
2. Radiologists are less or not available 24hours.
3. Hospitals where number of patients are more and radiologist's availability is less.
4. Remote areas where radiologists are not available.
5. Works on Web browser hence no installation required on PC.
6. Only access to internet is required, which also can be eliminated.
7. Takes Digital X-ray (Dicom), JPEG, PNG images.
8. X-ray can also be clicked from mobile and uploaded to software.
9. The time is around less than 5 minutes to process each X-ray and give results.
10. Can be used in Remote areas where Radiologists, Doctors are in short, they can

11. It will detect only Covid findings in X-ray not any other disease.
12. At a very low cost, detects Corona infection from X-ray.
13. No touching is involved hence there is no need of wearing any protective equipment.

## **Fact Si**

- So far tested 6730 CXRs out of which 2972 X-rays are Corona positive.
- The X-rays are from various countries like India, US, UK and Italy.
- Model accuracy is 96% likely to be improved further when more X-rays are provided.
- Developed with help of Radiologists and AI specialists.
- Tested by one radiologist.
- Detects Covid with following:
  - Peripheral patchy opacity
  - Ground-glass opacity
  - Lower zone opacity

## **Deploying AA+ Covid-19 Testing Solution:**

AA+ Covid-19 Testing Solution available both as a Web application and web-api and can be deployed within minutes. Built using our learning of deploying globally and remotely. The tool can be used to triage suspect patients in resource constrained countries to make effective use of RT-PCR test kits.

## **Proces s:**

This is just a 4 step process:

1. Collect the X-ray Image
  - a. If Digital X-ray directly upload Dicom image



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- b. If older machine, take screenshot of X-ray with mobile or any other tool.
2. Navigate to the tool URL
3. Upload X-ray and
4. Click Verify button, within seconds results are shown.



## References:

1. High priority target product profiles for new tuberculosis diagnostics: report of a consensus meeting, tech. rep., World Health Organization, Apr 28-29, 2014.
2. Covid 19 Imaging Recommendation by Indian Radiological and Imaging Association (IRIA), <https://iria.org.in/covid-19-imaging-recommendations-2/>
3. Wong et al. Frequency and distribution of Chest Radiographic Findings in COVID 19
4. Positive patients. Radiology. March 2020. nature are attributed to be the most common findings with respect to COVID related infections on CXRs. CXRs can help in identifying COVID-19 related infections and can be used as a triage tool in most cases.

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# Patient Report

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## Patient Report Sample:

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### Patient Report

Patient Name : _____	Age : _____
Gender : _____	Date and Time : _____
Nature Of Sample : _____	Confidence Score : _____
Prediction : _____	

**Remark :** This software platform is showing the result of X-ray based on the past records of such patients and COVID-19 disease and hence the accuracy is subject to error. It neither confirm nor deny the result as the final result.

### X-Ray in Heat map



1. The tool is developed to support Doctors to fight with the current pandemic situation, with limited set of data, hence Doctor's appropriate intervention will be required to correctly interpret the tool findings to accurately diagnose the presence or absence of Corona.
2. Any hardware, X-Ray machines needed for performing the test will be in client scope.
3. The tool is not for any clinical use.
4. The tool is not a replacement for Covid19 RT-PCR-Tests or any other required/mandatory test/s or procedures as may be required.
5. X-ray image should not have any Text and foreign entity like Stunts, Clips etc.
6. X-ray should be of Frontal View.
7. X-ray should be clear with no light reflection.
8. The X-ray resolution must be minimum 512 x 512.
9. Tool does not detect any disease other than Covid19 as contemplated for its use.
10. This is assistive tool for doctors to find Covid19 suspect.
11. For Patients suffering from multiple disease findings reflecting in X-ray, if any, the tool will have low accuracy in detecting Corona, hence in such cases appropriate Doctors/Radiologists intervention will be required.
12. There shall be no liability on our part with regards to interpretation of the tool

## Disclaimer

All information/diagnosis provided via the AI Tool is for general information purposes and is not intended or implied to be used to make decisions on medical treatment or to make a diagnosis of a medical problem. No information provided is intended or implied to replace consultation with a qualified physician. ESDS does not practice medicine, nor does it provide medical advice. You should discuss your medical symptoms with your physician or other qualified healthcare providers before deciding on any medicine. All information from this or any other source needs to be reviewed carefully with your own doctor before you act upon it in any way. While this tool attempts to provide information, which may be relevant to you, no guarantees are made that some relevant information will not be missed.

Please note that all findings of the report, including advice, if any, suggestions, and/or recommendations have NOT been generated as part of any professional evaluation, but using AI (Artificial Intelligence). No patient has been examined prior to making these comments. ESDS does not practice medicine & neither is into healthcare business. You are advised to discuss the findings and correlate clinically with a physician or other qualified healthcare provider, and to only act upon the advice of a physician or other qualified healthcare provider.



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