

## Air Monitoring to Collect SARS Covid 2 Virus in Hospital Wards with Positive Covid Patients

Pierangelo Clerici<sup>1\*</sup>, Massimo De Paschale<sup>1</sup>, Laura Castelnovo<sup>2</sup> and Antonino Mazzone<sup>2</sup>

<sup>1</sup>Microbiology Unit, Hospital of Legnano, ASST-Ovest Milanese (Milan), Italy

<sup>2</sup>Department of Internal Medicine, Hospital of Legnano, ASST-Ovest Milanese (Milan), Italy

**\*Corresponding Author:** Pierangelo Clerici, Microbiology Unit, Hospital of Legnano, ASST-Ovest Milanese (Milan), Italy.

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### Abstract

CDC and WHO refer that the aerosol transmission in hospital ward play a fundamental role. The presence of virus in the aerosol of High Risk Wards should be regularly monitored to verify their absence.

The reason of this paper was to verify the absence of SARS-CoV 2 in the High Risk Wards of the Legnano Hospital.

The air was tested in two different wards: High Risk Wards with presence of COVID Virus positive patients and traditional wards without presence of COVID virus negative patients.

The air sampler was the AIR.BIO VIRUS (Orum International Milano)<sup>1</sup> and the sampling was repeated 8 times.

Positive and negative samples were tested to verify the correct functionality of the sampler. The collected samples were then tested for the DNA and RNA extraction.

All the collected samples were negative in the tested wards.

**Keywords:** Aerosol; CDC; Droplets; DNA; Respiratory Particles; RNA; Virus; WHO

### Introduction

Droplets are larger respiratory particles that after cough or sneeze of positive COVID person remain in the air up 3 hours and fall onto surface within 2 meters. If aerosol contains the virus in sufficient quantity, a susceptible person could inhale them and become infected.

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<sup>1</sup>The used air sampler is the result of the European project EUCLID CEPA13 "Protection of personnel against pathogen microorganisms via air sampling and rapid detection and identification".

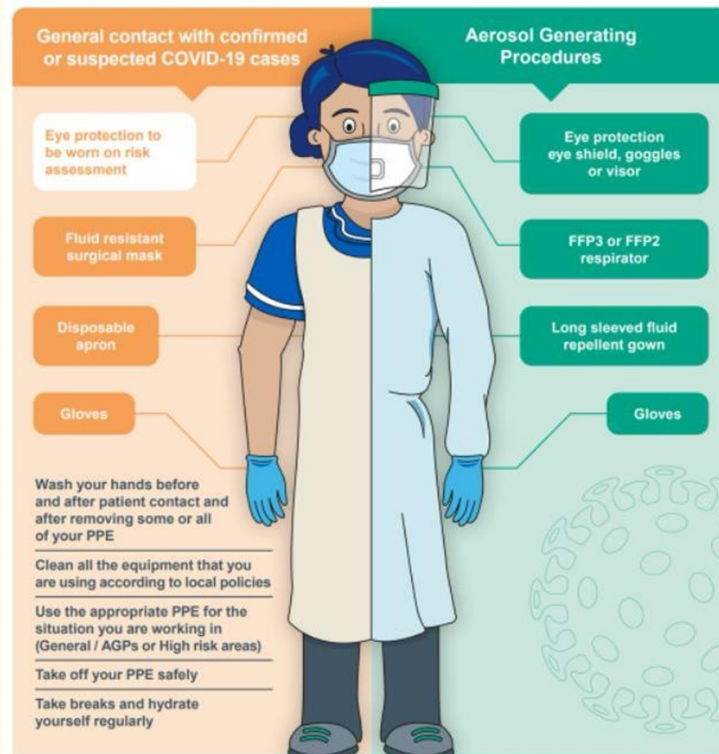
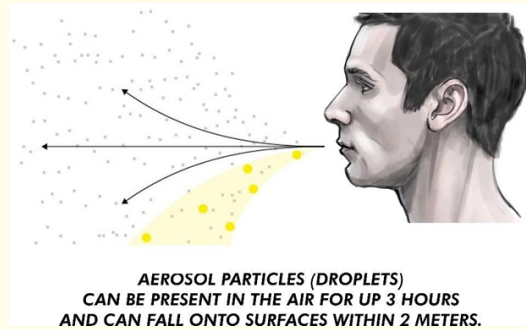


Figure 1

The presence of virus in the bio-aerosol of High Risk Wards should be monitored according to a scheduled program.

This paper was specifically prepared to show how to follow a protocol with the purpose to verify that the cleaning and disinfection operation of the environment was successfully and the personnel correctly trained to avoid their contamination [1-5].

## Materials

### Airbio virus air sampler



**Figure 2**

It has the purpose to collect bio-aerosol in a liquid to be then used for Rapid Analytical tests (DNA- RNA). It consists of a conic container in which the bio-aerosol is in contact with a liquid that is then tested by PCR to evaluate the possible virus presence.

Collecting liquid:

- COPAN DMEM.

DNA RNA instrumentation:

- Seegene Star Let
- DiaSorin MDX
- Technogenetics, Pana 9600 S.

Positive-negative test:

- Control
- Positive sample.

Reagent for the test:

- Seegene
- Diasorin.



Figure 3

**Protocol**

Bio aerosol collection	Sample transfer to laboratory	Sample processing	Sample analysis	Final results	Decontamination
Airbio virus Sampler	Conical tube	Concentration Extraction	Realtime PCR	Few hours	Autoclaving

**Positive test**

Positive Reference	Positive Reference
Positive	Positive

**Negative test**

Negative Reference	Negative Reference
Negative	Negative

**Bio-aerosol collection**

- Sampler wards: The sampling was made in wards with COVID patients and without COVID patients.
- Sampler positioning: The air sampler was positioned in the trajectory of the air and at 1 meter from the bed at the height of the bed.
- Air flow rate of the air sampler. 100 l/m.
- Volume of aspirated air. 1000 litres of air.
- Time of sampling cycle 30 minutes.
- Air sampler sterilization at 121°C for 20 minutes autoclaving.

**Rapid test analysis**

- 3 RT-PCR platforms for each sample were used to guarantee the result comparison.
- Extraction.
- Cold Extraction by Seegene.
- Real Time PCR.

**Results**

**Wards with COVID positive patients**

Sample A	Sample B	Sample C	Sample D
Negative	Negative	Negative	Negative
Negative	Negative	Negative	Negative
Negative	Negative	Negative	Negative

**Wards with COVID negative patients**

Sample E	Sample F	Sample G	Sample H
Negative	Negative	Negative	Negative
Negative	Negative	Negative	Negative
Negative	Negative	Negative	Negative

**Conclusion**

The results confirm that the tested patient wards (with COVID positive patients) have a suitable system of air quality, the disinfection system and the HVAC are correct and the medical and paramedical staff is very well trained to avoid contamination.

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