

## There is no planet B: masks UVC disinfection to rise to the environmental challenge during COVID-19

Domitilla Marconi

*D Amodeo<sup>1</sup>, D Marconi<sup>2</sup>, I De Palma<sup>1</sup>, C Petri<sup>1</sup>, N Nante<sup>1,2</sup>, G Messina<sup>1,2</sup>*

<sup>1</sup>Department of Molecular and Developmental Medicine, University of Siena, Siena, Italy

<sup>2</sup>Post Graduate School of Public Health, University of Siena, Siena, Italy  
Contact: d.marconi2@student.unisi.it

### Background:

Since the outbreak of Sars-CoV-2 public health measures have been adopted globally, most notably the use of face masks has become essential and often mandatory. As a result, about 3.4 billion single-use face masks are estimated to be discarded daily worldwide. Due to waste mismanagement, the COVID-19 pandemic is severely impacting the environment, the ecosystem and therefore human health. We aimed to assess if UV-C light is an efficient tool for proper mask disinfection, to guarantee their safe reuse and reduce their waste.

### Methods:

In October 2020 we conducted a cross sectional study on KN95 masks. Various operators wore the masks during their shift in the laboratory for 8, 16 and 24h. Contact plates were used to measure microbial contamination on both surfaces of the masks at time T(0). Then, masks were placed into a UV-C box (volume of 0.012 m<sup>3</sup>, 40 UVC LED at 270nm at 3mW) for a treatment of 3 minutes. We repeated the sampling at time T(1). We incubated all plates at 36 °C and read them after 48h. We performed descriptive and inferential (Wilcoxon matched pair test) analysis with Stata. Significance level was set at  $p < 0.05$ .

### Results:

We always observed greater contamination on internal surfaces than external ones. At T(0) the medians of CFU on samples of

internal surface were 212.7 (CI 95% 0-480.2) at 8h, 311.7 (0-683.1) at 16h and 404.7 (0-736.1) at 24h; at T(1), CFU reduced ( $p < 0.05$ ) and were respectively 3.2 (0-6.2), 2 (0-5.9) and 50.6 (0-164.7). At T(0) the medians of CFU on external surface were 23.7 (0-48.4), 53.2 (0-143) and 24.3 (0-71.8); at T(1) they respectively reduced ( $p < 0.05$ ) to 8.7 (0-25.2), 18.2 (0-70), 2.3 (0-6.1).

**Conclusions:**

Results showed that UV-C is effective in mask disinfection although an uncomplete abatement of the microbial load. It could be due to the limited UV-C dose or to its difficulty to penetrate among the meshes of the mask. Further investigation is needed to find a sustainable solution for mask use.

**Key messages:**

- UV-C seems a valid disinfection tool for used KN95 masks.
- The development of strategies for proper disinfection of masks should be carried out to guarantee reusability and reduce waste production.