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# Longitudinal, size-resolved air sampling of SARS-CoV-2 in hospital corridors and relations to the indoor environment

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Inhalation of airborne SARS-CoV-2 is considered an important transmission route for Covid-19. Several previous studies have reported on collecting SARS-CoV-2 from air in hospital environments, however, most of these sampled close to patients (Dinoi *et al.*, 2022). For example, we measured airborne SARS-CoV-2 during ongoing medical procedures in a recent publication (Thuresson *et al.*, 2022). There have been some reports on crude size distributions, where viral RNA seems more present in smaller sizes, for example by Santarpia *et al.* (2021), but detailed information about size distribution of SARS-CoV-2-containing aerosols is lacking.

The corridors of hospitals, where infected patients are not normally present, is an environment where hospital staff normally wear less protective equipment. However, there is still an infection risk, not least from pre- or asymptomatic staff. Understanding the size distribution of virus-containing aerosols in these areas is important to predict e.g. aerial spread indoors.

The aim of this work is to investigate the presence of airborne SARS-CoV-2 in corridors of infection wards, and gain more detailed size information of SARS-CoV-2-containing aerosols. Associations between SARS-CoV-2 presence and relative humidity and/or temperature in the facilities is also explored.

**Method**

Aerosol particles were collected in hospital corridors from March 2020 to April 2021 at infectious disease wards in Southern Sweden. Collection was performed using two 8-stage cascade impactors (Next Generation Impactor, Copley Scientific, UK) operating at flowrates of 60 L min-1 for 12 hours a day, 7 days a week (i.e. 300 $m^3$ of air sampled for each impactor per week). Every 7 days, the impactor plates were exchanged and each impactor stage was swabbed with a wetted nylon swab (Copan Scientific). The sample was then stored in universal transport media in -80 °C until analysis with real time reverse transcription polymerase chain reaction (RT-qPCR) for detection of SARS-CoV-2 RNA. The size fractions collected were: >8.1 µm, 4.5–8.1 µm, 2.9–4.5 µm, 1.7–2.9 µm, 0.9–1.7 µm, 0.6–0.9 µm, 0.3–0.6 µm, and 0.1–0.3 µm.

Indoor temperature, relative humidity and CO2 concentration was recorded with a CL-11 or CP-11 multiple parameter meter (Rotronic, Germany). Recording was done 24 hours a day, 7 days a week, during the entire sampling period.

**Results and discussion**

At this point, 330 of 784 samples have been analysed by RT-qPCR. 23 of these samples are preliminary positive for SARS-CoV-2, but analysis is ongoing.

Temperature measurements showed a mean corridor temperature of 23.4°C (SD: 0.38). Relative humidity varied between 6 and 67 % (mean: 28.4, SD: 10.6).

Our results are expected to increase the knowledge about virus presence in hospital corridors, and what aerosol particle sizes that contain SARS-CoV-2. This is important to help understand particle origin, transmission patterns indoors, and where these particles deposit in the respiratory system when inhaled. Understanding possible relations to temperature and relative humidity could improve mitigation strategies related to controlling the indoor environment. Furthermore, the vast material collected could be of interest for examining other indoor aerosols, such as mould or pollen.

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