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PRODUCT COMPARISON

Pairing CO_2 sensors with the AerosolSense Sampler: A layered approach

As the COVID-19 pandemic continues, it has become clear that we cannot rely on only one layer of protection to safeguard public health. It will take a combination of layered tools to combat viruses like SARS-CoV-2. Facilities can choose from masking, surface cleaning, social distancing, individual testing, and other methods. It is important to evaluate the strategy that has been put in place and to ask, "Has the right combination been implemented?" and "Is it proving to be effective?" Monitoring pathogens in the air can provide the answers to those questions.

Implementing a layered strategy

Keeping indoor air safe requires multiple layers of tools, each with its own strengths. The weaknesses of any single tool can be offset by the strengths of another tool. Consider, for example, the effectiveness of the following layers working together:

- Vaccines
- Environmental surveillance paired with PCR
- Testing: Individual screening/Asymptomatic
- Masks
- Social distancing
- Ventilation
- Disinfecting

Many European countries are using CO_2 sensors to monitor indoor ventilation. The amount of carbon dioxide indicates how much or how little ventilation is in an indoor space. We know that COVID-19 is spread through airborne aerosols that an infected person releases by talking, sneezing, laughing, and coughing, and that it can linger in the air over time. If ventilation in a space is poor, the air could contain any number of pathogens, including Flu A/B, SARS-CoV-2, and/or RSV. Does improving the ventilation mean the air is safe? Is it enough?

If a layered approach is implemented that includes the Thermo Scientific™ AerosolSense™ Sampler alongside a CO_2 sensor, then a high CO_2 reading could serve as an alert to run the AerosolSense Sampler to find out what exactly is in the poorly-ventilated air. It could also provide early insight into airborne pathogen presence to indicate the need for increased ventilation. The AerosolSense Sampler paired with the gold standard of testing, polymerase chain reaction (PCR), identifies Flu A/B, SARS-CoV-2, and/or RSV and is highly sensitive. These technologies could work together to strengthen a risk mitigation strategy. Together, they can help identify high risk areas and potential spread of virus.

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Question	CO_2	AerosolSense Sampler paired with PCR testing
What information can I get from the device?	• How much CO_2 is present in the air • How well ventilated the indoor air is	• Presence or absence of in-air pathogens such as Flu A/B, SARS-CoV-2, and/or RSV.
Is the information I get actionable?	The information a CO_2 sensor provides is limited to how much CO_2 is present, and by extension, how well ventilation is working. The information is actionable, but not exact as far as pathogen presence to take more informed actions.	Air samples are PCR tested, the industry gold standard in testing that is highly accurate and reliable. These data driven results enable risk assessment. If SARS-CoV-2 is not detected in the environment, then there is confidence that current safety protocols are effective. If SARS-CoV-2 is detected in the air, additional safety measure can be implemented such as, increased testing, disinfecting and mask mandates. A re-sample of air after adjustments can indicate effectiveness.
Is ventilating by itself enough?	Proper ventilation helps control the amount of CO_2 in the air of indoor spaces. Even with good ventilation, there are still unkowns of what exactly is in the air.	With partially vaccinated populations, resistance to mask wearing, increased indoor capacities, asymptomatic cases and the Delta variant within indoor spaces - good ventilation with CO_2 monitoring is important, but may not be enough. The sampler paired with PCR testing identifies SARS-CoV-2, Flu A/B and RSV. This identification allows for timely risk assessment and protocol adjustment.
If we improve ventilation after a high CO_2 reading, how do we know the air is safe?	After ventilation is improved, run the CO_2 sensor again. There are still unkowns of what exactly is or remains in the air.	Running a CO_2 sensor could be the first step in your air monitoring strategy followed by ventilation improvements. The AerosolSense Sampler paired with PCR testing is complementary because it provides additional insight into the presence of SARS-CoV-2, Flu A/B and RSV. If these pathogens are identified as present, additional safety protocols can be made.
How do the devices work?	Of the three types of CO_2 sensors, the one most often used is the non-dispersive infrared sensor (NDIR). NDIR sensors use specific wavelengths of light to measure the amount of CO_2 in the air. When air enters the sensor, the sensor activates a light set at one of the wavelengths for CO_2 at one end of the sensor. The other end holds a receptacle that measures how much light gets to the other side. When the light is activated, any CO_2 in the air sample absorbs some of the beams, and the amount of light that gets to the other side of the sensor decreases. The amount of light that gets absorbed depends on how much CO_2 is present. The more CO_2 that is present, the more light that is absorbed.	The sampler collects air samples through an omnidirectional inlet. A cartridge installed into the sampler contains the collection substrate, to which the air sample is directed through an accelerating slit impactor. Particles are trapped on the collection substrate as the air moves around the collection area. After the sampling cycle completes, the sample cartridge is removed and sent to a laboratory for PCR testing.

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