

## Spirometry Learning Module

### INFORMATION PAPER: POINT-OF-CARE SPIROMETRY INFECTION CONTROL POST EASING OF COVID-19 RESTRICTIONS

Recommendations on lung function testing during COVID-19 are continuing to evolve.

Concern has been raised that pulmonary function testing could represent a potential avenue for COVID-19 transmission due to the potential for coughing and droplet formation surrounding pulmonary function testing procedures.

In health care settings most patients are screened for symptoms before entry, but it is more difficult to screen and assess patients with pulmonary disease who are more likely to have respiratory symptoms unrelated to COVID-19.

“There remain many unknowns about the possibility of transmission in this setting and the data are in evolution; however, the risks of transmission may be significant, and likely vary based on the prevalence of the virus in the community and the age, severity of lung disease, and presence of immunosuppression.” (McCormack & Kaminsky on behalf of American Thoracic Society Proficiency Standards for Pulmonary Function Testing Committee, 2020)

<https://www.thoracic.org/professionals/clinical-resources/disease-related-resources/pulmonary-function-laboratories.php>

The recommendations in this document incorporate infection control measures that take into consideration the current low levels of community transmission in South Australia but the imminent easing of interstate and overseas border restrictions that may lead to an increase in disease presence, the likelihood of increasing numbers of asymptomatic COVID-19 positive individuals in the South Australian community and that there is no SARS CoV2 vaccine available currently.

In accordance with the UPDATE ON SUSPENSION OF LUNG FUNCTION TESTING from the Thoracic Society of Australia & New Zealand (TSANZ) and the Australian & New Zealand Society of Respiratory Science (ANZSRS) dated 30<sup>th</sup> April 2020, the following is noted:

- All pulmonary function testing can now be performed in patients who are afebrile, and who have no symptoms of a viral illness. In such patients, infection control measures, such as level of Personal Protective Equipment (PPE) and cleaning of equipment between patient in line with respective Federal and State health departments, and physical distancing in public areas is still required.
- It is recommended that body temperature is measured on all patients prior to testing to ensure they are afebrile. Pulmonary function testing is NOT recommended in patients who are febrile, or who have an escalating acute respiratory condition.
- It is also recommended that testing only be performed using lung function equipment that utilise inline filters.

<https://www.thoracic.org.au/documents/item/1879>

#### **Considering these guidelines, the Spirometry Learning Module (SLM) Development Group recommend the following infection control measures:**

- All patients presenting to the practice, clinic or health service should be administered a COVID-19 risk factor questionnaire that includes clinical and epidemiological enquiry of COVID-19 such as presence of acute respiratory symptoms, fever, recent overseas travel or contact with a suspected / confirmed COVID-19 case.
- All patients attending should have their temperature taken (via tympanic thermometer). Febrile patients and / or patients with new respiratory symptoms should be excluded from spirometry testing.
- Cough etiquette and respiratory hygiene must be observed at all times.

- Physical distancing remains in place and is to be observed as best as practicable.
- Staff and patients should observe physical distancing: at least 1.5 m is required between people except when physical distancing is impossible, e.g. during physical examination, clinical care or testing.
- Patient testing should occur in single rooms where practicable.
- Visitors accompanying patients should be discouraged however consideration needs to be made for essential patient support and / or appropriate chaperoning e.g. heightened patient anxiety, disabilities, interpreter, carer, children, gender.
- Strict adherence to hand hygiene for both the patient and the operator should be observed at all times.
- **Point-of-care (POC) spirometry testing should only proceed with an in-line, high efficiency, single patient use, anti-bacterial / anti-viral filter in place.**

*Discussion Point 1:* The manufacturer and /or company representative of individual spirometer devices should provide information about the efficiency, suitability and compatibility of inline filters for specific devices.

It is important to note that **the use of the wrong inline filter can result in significant errors in spirometry measurements.**

*It is the responsibility of individual health services to ensure that the correct inline antiviral filter is used with their spirometer device.*

Detailed information about spirometer devices commonly in use in Australia, including distributor contact details and infection control features, can be found in the document Spirometer Users and Buyers Guide (NAC, 2015).

<https://www.nationalasthma.org.au/living-with-asthma/resources/health-professionals/information-paper/spirometry-users-buyers-guide>

*See Appendix 1 for information regarding ndd spirometer devices*

- Literature reviews are inconclusive as to whether spirometry is classified as an aerosol generating procedure requiring use of airborne precautions.
- **It is the recommendation of this document that droplet precautions be applied to spirometry** \*see Discussion Point 2.

*See 'Relevant Standards' for links to contact and droplet precautions.*

The choice and level of PPE used as part of droplet precautions is at the discretion of individual general practices or health services and should be informed by the potential infection risk to Health Care Workers (HCWs) and patients attending the workplace. **The health and safety of HCWs and patients should be the priority at all times and infection risks mitigated** \*see *Relevant Standards*

*Discussion Point 2:* It is recognised that spirometry can regularly elicit a cough in many patients performing spirometry and that poor cough etiquette is often observed.

In addition, spirometry operators are in close proximity to the patient due to the nature of spirometry instruction and there is an increasing likelihood that the number of asymptomatic COVID-19 positive patients in the South Australian community will increase.

**The use of an inline filter alone will not entirely remove the risk of droplet contamination** when these factors are considered, so the choice and level of PPE used by spirometry operators in the health service should be carefully considered.

- All surfaces, chairs, stadiometer, weigh scales etc in contact with the patient should be wiped with antimicrobial wipes.

## FULL CONTACT AND DROPLET PRECAUTIONS

- Perform hand hygiene
- Use gloves, surgical mask and eye protection (safety glasses or face shield):
  - gloves must be removed, and hand hygiene performed after each patient; new gloves are required for the next patient.
  - safety glasses and face shields can be worn during consecutive patient testing in the same location
  - if labelled as reusable, the face shield can be cleaned with a detergent / disinfectant wipe in between uses.
  - if surgical masks are in short supply, they can be used for periods up to 4 hours during consecutive patient testing in the same location.
  - the mask should be discarded if it becomes wet or contaminated and on leaving the room so care should be taken not to touch the mask while it is in place; if the front of the mask is touched it should be moved and discarded, hand hygiene should be performed and a new mask fitted.
- Removal of PPE  
At the end of the testing session:
  - remove gloves; perform hand hygiene.
  - remove gown or apron (if worn); perform hand hygiene.
  - remove face shield or safety glasses without touching the front; perform hand hygiene.
  - remove mask, without touching the front; perform hand hygiene.
- Environmental hygiene
  - In addition to routine cleaning, frequently touched surfaces should be wiped after every patient, with detergent / disinfectant wipes or a detergent product, using a disposable cloth.
  - Any contaminated or visibly soiled surface should be cleaned / disinfected immediately.
  - Information about environmental cleaning and disinfection for health and residential care facilities is provided in the publication 'Coronavirus (COVID-19) Environmental cleaning and disinfection principles for health and residential care facilities' available on the Australian Government Health website.  
<https://www.health.gov.au/resources/publications/coronavirus-covid-19-environmental-cleaning-and-disinfection-principles-for-health-and-residential-care-facilities>

## FURTHER DISCUSSION

- Section 3.1 of the NH&MRC Australian Guidelines for the Prevention and Control of Infection in Healthcare (2019) states that it is essential for standard precautions to be applied at all times to minimise the risk of transmission of infectious agents because:
  - people may be placed at risk of infection from others who carry infectious agents.
  - people may be infectious before signs or symptoms of disease are recognised or detected, or before laboratory tests are confirmed in time to contribute to care.
  - people may be at risk from infectious agents present in the surrounding environment including environmental surfaces or from equipment.

- there may be an increased risk of transmission associated with specific procedures and practices.
- A comprehensive overview of droplet and aerosol generation can be found in a recently published paper “Airborne transmission of severe acute respiratory syndrome coronavirus-2 to healthcare workers: a narrative review” by N Wilson et al, (2020). This is a local publication by Australian and New Zealand authors.  
 “Exhalation creates a jet with a cone-shaped geometry. Sneezes and coughs can form a turbulent multiphase gas cloud protecting the droplets from evaporation. This may extend the lifespan of a droplet allowing it to travel further (Bourouiba 2020). This cloud can travel up to 8 m, carrying a polydispersed range of droplets. Eventually the cloud loses momentum and the remaining droplets evaporate forming droplet nuclei that remain suspended for hours with the ability to cause longer-range infectious transmission.” (Bourouiba 2020; Yu et al, 2004).
  - The University of Oxford, Centre for Evidence-Based Medicine (Heneghan, Brassey & Jefferson, 2020) addressed the question of “What proportion of COVID-19 cases are asymptomatic?”  
 Their findings showed that:
    - between 5% and 80% of people testing positive for SARS-CoV-2 may be asymptomatic.
    - symptom-based screening can miss cases, perhaps a significant number.
    - some asymptomatic cases can become symptomatic within one week (sometimes known as “pre-symptomatics”).
    - children and young adults can be asymptomatic.
    - there is no single reliable study to determine the number of asymptomatic people. It is likely only population-based antibody testing will yield reliable data.

Recommendations have not been made about precautions to take when using peak flow meters and microspirometers (such as PiKo6 and COPD-6 devices) in health care settings.

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## RELEVANT STANDARDS

Australian Government Infection Control Expert Group; Guidance on the use of personal protective equipment (PPE) for non-inpatient healthcare and specimen collection, during the COVID-19 outbreak - Version 7 (17/06/20).

<https://www.health.gov.au/sites/default/files/documents/2020/06/coronavirus-covid-19-guidance-on-use-of-personal-protective-equipment-ppe-in-non-inpatient-health-care-settings-during-the-covid-19-outbreak.pdf>

National Health & Medical Research Council (NH&MRC) 2019, Australian Guidelines For The Prevention And Control Of Infection In Healthcare, ISBN Online: 978-1-86496-028-0, NH&MRC, Canberra.

Section 3.2 Transmission-based precautions (including droplet precaution guidelines).

<https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019>

The Royal Australian College of General Practitioners. Infection prevention and control standards for general practices and other office-based and community-based practices. 5th edn. East Melbourne, Vic: RACGP, ISBN 978-0-86906-383-5; Published May 2014, updated June 2016.

Section 1.4: Precautions.

<https://www.racgp.org.au/running-a-practice/practice-standards/standards-for-other-health-care-settings/view-all-health-care-standards/infection-prevention-and-control>

## REFERENCES

Bourouiba, L 2020, 'Turbulent gas clouds and respiratory pathogen emissions: potential implications for reducing transmission of COVID-19', *Journal of the American Medical Association*, vol. 323, no. 18, viewed 22 May 2020, <<https://doi.org/10.1001/jama.2020.4756>>.

Heneghan, C, Brassey, J & Jefferson, T 2020, 'COVID-19: What proportion are symptomatic?', Blog post, University of Oxford: The Centre for Evidence-Based Medicine, 6 April, viewed 22 May 2020, <<https://www.cebm.net/covid-19/covid-19-what-proportion-are-asymptomatic/>>

McCormack, MC & Kaminsky, DA 2020, 'Pulmonary Function Laboratories: Advice Regarding COVID-19', *American Thoracic Society*, viewed 21 June 2020, <<https://www.thoracic.org/professionals/clinical-resources/disease-related-resources/pulmonary-function-laboratories.php>>

Wilson, NM, Norton, A, Young, FP & Collins, DW 2020, 'Airborne transmission of severe acute respiratory syndrome coronavirus-2 to healthcare workers: a narrative review,' *Anaesthesia*, viewed 22 May 2020, [https://doi: 10.1111/anae.15093](https://doi.org/10.1111/anae.15093)

Yu, ITS, Li, Y, Wong, TWW, Tam, W, Chan, AT, Lee, JHW, Leung, DYC & Ho, T 2004, 'Evidence of airborne transmission of the severe acute respiratory syndrome virus', *New England Journal of Medicine*, vol. 350, viewed 22 May 2020, <<https://www.nejm.org/doi/full/10.1056/NEJMoa032867>>.

## APPENDIX 1

### USE OF FILTERS WITH NDD EQUIPMENT

<https://www.ndd.ch/en/ndd/resources/covid-19.html>

Inline filter for EasyOne Air.

[https://d3cumwfln92soa.cloudfront.net/14583faa51c99e04922314784da209dcd97f383c/ndd\\_Medical Inline Filter Solution EasyOne Air EN V01R.pdf](https://d3cumwfln92soa.cloudfront.net/14583faa51c99e04922314784da209dcd97f383c/ndd_Medical Inline Filter Solution EasyOne Air EN V01R.pdf)

Inline filter for Easy on-PC.

[https://d3cumwfln92soa.cloudfront.net/d55487e3b6f339ca95de74573c09a81a1fdb06f3/ndd\\_Medical Inline Filter Solution Easy on-PC EN V01R.pdf](https://d3cumwfln92soa.cloudfront.net/d55487e3b6f339ca95de74573c09a81a1fdb06f3/ndd_Medical Inline Filter Solution Easy on-PC EN V01R.pdf)

*\*While ndd spirometer devices are used in the author's health services, these spirometers are not exclusively endorsed or recommended by the authors or this information paper.*