OSHA COVID-19 ETS and Spirometry

During my reading of the OSHA COVID-19 Emergency Temporary Standard (ETS), I noticed it does not mention the need for spirometry testing. Furthermore, spirometry testing is not even listed as an aerosol generating procedure. Paragraph (b) provides a definition of aerosol generating procedures. Here's how they define it:

(b) Definitions. The following definitions apply to this section:

Aerosol-generating procedure means a medical procedure that generates aerosols that can be infectious and are of respirable size. For the purposes of this section, only the following medical procedures are considered aerosol-generating procedures: open suctioning of airways; sputum induction; cardiopulmonary resuscitation; endotracheal intubation and extubation; non-invasive ventilation (e.g., BiPAP, CPAP); bronchoscopy; manual ventilation; medical/surgical/postmortem procedures using oscillating bone saws; and dental procedures involving: ultrasonic scalers; high-speed dental handpieces; air/water syringes; air polishing; and air abrasion.

COVID-19 and NIOSH Spirometry

On May 25, 2021 NIOSH updated its spirometry testing recommendations for those participating in the Coal Workers' Health Surveillance Program (CWHSP). NIOSH states that these programs can resume if:

1) recommended infection prevention and control precautions are implemented.
2) guidance from state and local health departments is followed, and
3) information about community transmission of SARS-CoV-2 is considered.

You may find these guidelines helpful for facilities conducting spirometry for other workplace surveillance programs.

Since the original March 2020 NIOSH recommendation to defer spirometry for the CWHSP due to concerns about possible SARS-CoV-2 transmission related to testing individuals with active infection, many clinics have incorporated similar measures to mitigate SARS-CoV-2 transmission and protect their staff and clients. However, the great majority of the U.S. population has now received COVID-19 vaccines or acquired some level of natural immunity from a prior infection.

NIOSH encourages CWHSP-approved spirometry clinics to review the detailed guidance and best practices provided with their May 25 release to determine if spirometry testing as part of the CWHSP can resume at their facility. NIOSH says they will continue to update these recommendations as conditions evolve.

If you desire to read the May 25 announcement use this URL:
https://www.cdc.gov/niosh/topics/cwhsp/makeroutine.html

Or, retrieve a copy from my publicly available folder. Just Click Here.
New Predicted Values for Lung Volumes

The GLI Network has developed all-ages reference equations for lung volumes for populations of European ancestry. An advantage of the newly developed unification of GLI lung function reference equations will be to improve the interpretation of lung function in patients with lung disease. Click this link to access the article: https://bit.ly/3hHZR1N

Data from 17 locations were submitted and reference equations were derived from 7190 observations representing participants of European ancestry between the ages of 5 and 80 years. Unfortunately, the majority of the data were from one location (testing facility), which could potentially bias the data, but statistical analysis suggests this was not the case. Unfortunately, there was insufficient data to develop multi-ethnic equations. Consequently, these newly developed predicted values have limitations (i.e., used for persons of European ancestry). Measurements of functional residual capacity (FRC) collected using plethysmography and dilution techniques showed physiologically insignificant differences and were combined as they demonstrated remarkable overlap. This would not be the case among persons with lung disease. Sex-specific reference equations including height and age were developed for total lung capacity (TLC), FRC, residual volume (RV), inspiratory capacity, vital capacity, expiratory reserve volume and RV/TLC. The derived equations were similar to previously published equations for FRC and TLC, with closer agreement during childhood and adolescence than in adulthood.

An interesting finding was that the population variability (coefficient of variation) was 20% for FRC which equates to a range of normal of 60–140%, much wider than the commonly used threshold of 80–120%. The normal range is also much wider and age-dependent for the remainder of the lung volume indices (e.g. TLC, ERV and IC) meaning that the limits of normal are not a fixed value that can be applied across the entire age spectrum.

For details, use the above link or look up:

Mask Exemption for Respiratory Patients

Worldwide several countries have at various times required mandatory wearing of face masks during the COVID-19 pandemic. Several countries have also instituted penalties for non-compliant individuals. However, there are also exemptions. For example in Spain, people with respiratory disorders or those that cannot wear masks for other health reasons are exempt. If wearing a mask has any benefit to the wearer (which itself is controversial), then the very population exempted from mask wearing is also the population at highest risk for COVID-19.

Soriano and colleagues expressed their opinion on this matter in a “letter” published in the *European Respiratory Journal* (https://bit.ly/2DTu7Y0). Their opinion is that within the Respiratory Effectiveness Group, people with asthma, COPD, and other respiratory diseases is not an impediment to wearing a mask, unless in acute respiratory distress, in which case going out in public is not advised anyway, due to their higher risk. They, propose not to exempt respiratory patients from compulsory use of face masks.

For details, go to the source.

Diffusion Capacity Abnormalities Post COVID-19

Just prior to the release of this newsletter, a study was published by Wei Qin and colleagues in the *European Respiratory Journal* titled: Diffusion capacity abnormalities for carbon monoxide in patients with COVID-19 at 3-month follow-up.

The objective of the study was to evaluate pulmonary function and clinical symptoms in COVID-19 survivors. The COVID-19 patients were prospectively followed-up with pulmonary function tests and clinical characteristics for 3 months following discharge from the hospital. Their study included 647 patients. Results of multivariable regression showed increased odds of ongoing symptoms among severe patients and patients with longer hospital stays. Pulmonary function test results were available for 81 patients, including 41 non-severe and 40 severe patients. In this subgroup, 44 (54%) patients manifested abnormal diffusing capacity of the lung for carbon monoxide (DLCO). Chest computed tomography (CT) total severity score on admission and acute respiratory distress syndrome were significantly associated with impaired DLCO. They concluded that pulmonary interstitial damage
might contribute to impaired DLco. This may explain why some patients continue to report shortness of breath after recovering from COVID-19.

For additional information, go to the source: Click here

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**Spirometry Interpretation Errors**

I was recently asked “How often are spirometry results interpreted incorrectly in a primary care setting?” My answer was “too often”. However, I decided to follow-up to see if any published studies would support my answer. I quickly found a 1999 study published in the journal Chest by Eaton and colleagues. In this study 559 spirometry tests were interpreted by primary care physicians and then by two experienced pulmonologists. For each spirometric record, the physician was asked to provide an interpretation choosing from the following possibilities: normal, early small airways disease, obstruction, restriction, mixed obstruction/restriction, inability to interpret due to inadequate spirometry, and other. These records were then reviewed by the two experienced pulmonologists. Both groups (primary care physicians and experienced pulmonologists) were provided the same information, which included: patient demographic data, indication for testing, forced expiratory values, predicted values, forced expiratory curves, and the acceptability and repeatability information.

Of the 559 patient tests, primary care physician’s interpretation was judged correct 53% of the time (296 of 559) when compared to the two experienced pulmonologists.

For more information, go to the source: Eaton T. Spirometry in Primary Care Practice. *Chest* 116, 1999.

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**Administration of Supplemental Oxygen**

An excellent article in the July 2021 issue of the *New England Journal of Medicine* by Sundara Rengasamy and colleagues review the administration of supplemental oxygen. In addition to the article, there is also a 15 minute video that summarizes the published text. Pulmonary function technicians not working in a hospital-based setting, may not see patients using supplemental oxygen. However, it’s helpful to understand how and when it’s used, such as for the treatment of hypoxemia.

The article includes the following topics:

- Overview of supplemental oxygen
- Indications
- Physiology of oxygen transport
- Sources of supplemental oxygen
- Approaches to administration
  - nasal cannula
  - simple face mask
  - face tent
  - non-rebreather face mask
  - Venturi mask
  - high-flow nasal cannula
- Risks and complications
- Summary

To read the article and/or watch it’s 15 minute video, Click here

Reminder:

“OSHA recommends that all persons conducting occupational spirometry testing successfully complete an initial NIOSH-approved spirometry course and maintain that certification over time. Some OSHA standards specifically require that health personnel who are not licensed physicians complete a spirometry training course if they test workers covered under those standards.”

Source: OSHA publication 3637-03 2013.
An easier, more accurate way to administer respirator fit tests using sweet or bitter fit test methods.

**QualFit** software automates and records qualitative respirator fit testing using Saccharin and/or Bitrex aerosol solutions. The software prompts the operator to deliver the aerosol solution with the correct number of squeezes for each exercise, at the proper time, and in the proper order. This improves fit testing accuracy. The software displays the current exercise in progress, automates the timing sequence and calculates the number of squeezes to be administered, based on threshold screening results. Visual and audible prompts allow the operator to focus their attention on the respirator wearer. The entire procedure becomes less frustrating for the operator and subject being tested. The software tracks each step of the fit testing procedure required in mandatory Appendix A of the OSHA Respirator Standard. **QualFit** software improves the quality and efficiency of respirator fit testing. An OSHA compliant report can be printed or electronically saved. The employer benefits by knowing the test procedure was properly administered and provides written documentation for compliance with record keeping requirements specified in paragraph “m” of the OSHA standard. The employee benefits by knowing a standardized procedure was followed, rather than what often appears to be a random procedure.

For Information visit: [www.QualFit.net](http://www.QualFit.net)
To place a secure online credit card order visit: [https://qualfit-software.square.site/](https://qualfit-software.square.site/)

**Training opportunities**

**Spirometry Refresher NIOSH-approved**

Refresher training is required every 5-years for testing technicians who wish to maintain their current NIOSH-approved training status. Refresher training is also recommended by the American Thoracic Society (ATS) and European Respiratory Society (source: ATS/ERS General Considerations for Lung Function Testing; *Eur Respir J* 2005; 26:258) and other organizations. This one-day course will be given by Roy McKay, Ph.D., a contributing author of the ATS/ERS standards. The course will review the 2005 ATS/ERS spirometry testing guidelines and will stress testing skills, spirometry patterns (flow & volume), recognition and causes of unacceptable maneuver performance, methods to improve testing technique, occupational surveillance concerns, and basic spirometry patterns. Examples of acceptable and unacceptable tracings will be shown to help the student recognize if the tracing should be rejected or if it has usable information. This course is also an excellent way to obtain answers to questions not foreseen during initial training and maintain your NIOSH-approved certification status.

**Partial Listing of Course Topics**

* Changes to spirometry standards.
* Definitions & Significance of:
  * FVC, FEV1, FEF 25-75%
* Review and improve proper test procedures and subject preparation.
* Recognition of unacceptable maneuver performance.
* How to identify an improperly performed test.
* How to use the Flow - Volume display to improve test performance.
* How to use Peak Flow to evaluate subject effort.
* How to recognize obstructive & restrictive patterns.
* Recognition of artifacts that impact patient test results (e.g., zeroing errors, sub-maximal effort, etc.)
* Methods you can use to improve test quality.
* Understanding the display and equipment recorder requirements of the ATS/ERS.

**Did you Know?**

Dr. McKay was a member of the task force that wrote the 2005 ATS/ERS standards for lung function testing. To learn more about ATS/ERS standards, including the 2017 Reporting Requirements and the 2019 Spirometry Update, consider taking a training class. Participation in these training programs provides an opportunity to improve your skills and contribute towards the health and well-being of others.

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previously attended a spirometry training program in the past.

Our next Spirometry Refresher classes will be held:
September 21, 2021

For additional information, visit our web site at:
www.DrMcKay.com

Certificates for persons that successfully complete all training requirements will indicate 7.5 contact hours with 0.75 CEUs from the University of Cincinnati.

**Interpretation of Spirometry:
Beyond the Numbers**
This one-day course is ideal for health professionals who desires a comprehensive training specifically devoted to interpretation of spirometry tests. Several interpretative strategies will be discussed including those consistent with the American Thoracic Society (ATS) and European Respiratory Society (ERS). The strengths, weaknesses, pitfalls, and limitations of other strategies (GOLD, NICE, etc.) will also be discussed from the perspective of a co-author of ATS/ERS spirometry and interpretative strategy guidelines. Spirometry parameters which should be used and those that should not be used for interpretation will be explained. Practice problems will help the student recognize acceptable from unacceptable trials and when unacceptable maneuvers still have usable information for interpretation purposes. Examples of poorly administered and improperly performed tests will be used to help students recognize poor subject effort, unacceptable maneuvers, limitations of equipment and other factors that alter interpretation algorithms. Students will also learn how to recognize the magnitude and direction of error introduced when less than ideal results are obtained.

A variety of methods will be presented to identify potentially significant change in lung function. This information is very helpful in regards to identifying persons with true lung disease versus variability in the test. At the conclusion of this course, students will be capable of recognizing acceptable spirometry maneuvers and will learn how to interpret test results while decreasing the false positive and false negative rate of obstructive and restrictive lung disease patterns. This course is a "must" for persons who need comprehensive training to properly interpret spirometry tests.

Objectives:

- Recognize important components of spirometry standards that impact interpretation of results.
- Interpret spirometry graphs as to the type of pattern.
- Recognize conditions that affect spirometry results.
- Identify errors in test procedures or testing equipment that may affect results.
- Recognize factors that cause miss-classification of spirometry patterns (i.e., obstructive to normal, etc.).
- Recognize potentially significant change in spirometry testing.

This course is a "must" for persons who want a comprehensive understanding of spirometry interpretation. At the conclusion of this course, students will learn how to interpret test results while decreasing the false positive and false negative rate of obstructive and restrictive lung disease patterns.

Students who materially participate and attend the entire training program will receive a training certificate from the University of Cincinnati (Sponsor & Accreditor) indicating 7.5 Contact hours (0.75 CEUs).

For a complete listing of course content, visit:
www.DrMcKay.com

Next course date: September 22, 2021

**Spirometry Fundamentals Workshop 1-day**
This 1-day spirometry training program covers the fundamentals of spirometry testing and is ideal for those working in family practice, internal medicine, and other clinical facilities. Students will learn basic spirometry terminology, definitions, and how to administer tests to meet American Thoracic Society (ATS) – European Respiratory Society (ERS) standards. Students will also learn the basic skills needed to “read” and understand volume-time and flow-volume tracings. In addition, students will learn how to recognize when tests meet acceptability and repeatability criteria and how to utilize the tracings to improve patient results and test quality. This is critically important since technically flawed tests too often lead to inaccurate interpretation of respiratory health. This may result in falsely labeling normal subjects as “impaired” or impaired subjects as “normal.” Such flawed results are not only useless, but also convey false information which could be harmful. This course will help testing technicians
identify technically flawed curves and distinguish acceptable from non-acceptable tests. This is an important concern, since spirometers generate printouts and reports, regardless of whether or not the results are accurate. Failure to obtain quality spirometry results can lead to inaccurate interpretation of results.

To accomplish this goal a combination of lecture, demonstration, and hands-on student participation will be used. All participating students will receive a certificate of completion from the University of Cincinnati. All lectures will be given by Dr. Roy McKay, who has taught spirometry training for nearly three (3) decades and a co-author of ATS/ERS standards.

Who Should Attend:
This course is designed for persons who plan to conduct spirometry testing in an office or clinical setting. This course is not designed for students who need a NIOSH-approved course for testing in an occupational setting. Students who need NIOSH-approval should consider taking our 3-day NIOSH-approved spirometry training course (course approval # 010).

Prerequisites:
None. No prior experience is needed.

Objectives:
The participant will learn the fundamental principles and skills needed to obtain tests that meet American Thoracic Society (ATS) – European Respiratory Society (ERS) standards for spirometry.

Listing of Course Topics:
Overview of spirometry standards
Definitions: FVC, FEV₁, FEV₁/FVC%, Peak Flow, etc.
How to read volume-time and flow-volume tracing
Acceptability & repeatability criteria
How to administer a spirometry test & testing technique
How to recognize tests with less than maximal effort
Common spirometry problems, pitfalls, and solutions
Predicted normal values
Basic spirometry patterns (normal, obstructive, restrictive, & mixed)
Calibration and system verification requirements
Workshop:
  Demonstration of testing technique
  Student participation (hands-on testing)

NIOSH-Approved Spirometry Training
This 3-day "initial" training course is designed for persons who need to learn how to administer spirometry testing according to the most recent 2019 ATS/ERS guidelines. This “hands-on” training covers all aspects of spirometry testing and uses a combination of lecture, hands-on training and small group problem solving sessions.

Next NIOSH-approved Spirometry course dates:
March 24-26, 2020
June 9-11, 2020
September 15-17, 2020
November 17-19, 2020

Certificates for persons that successfully complete all training requirements will indicate 22 contact hours with 2.2 CEUs from the University of Cincinnati.

Remainder Course Schedule
The University of Cincinnati is pleased to announce the following training courses that may be of interest to you or your staff. They are:

Interpretation of Spirometry - Beyond the Numbers:
September 22, 2021

NIOSH-Approved Spirometry
http://www.drmckay.com/niosh-course.shtml
September 14-16, 2021
November 16-18, 2021
March 22-24, 2022 (tentative date)
June 7-9, 2022 (tentative date)

Spirometry REFRESHER (NIOSH-approved):
http://www.drmckay.com/spirometry-refresher.shtml
September 21, 2021

Overview of Respiratory Protection
http://www.drmckay.com/rfc-overview.shtml
October 19, 2021

Fit Testing Workshop (2-day):
October 20-21, 2021

Fit Testing Refresher & Advanced Topics
http://www.drmckay.com/rfc-resp-refresher-advanced.shtml
2022 Date to be Determined
Respirator Selection & Cartridge Change Out
Schedule Workshop
2022 Date to be Determined

All courses are held in Cincinnati, unless noted otherwise. On-site training is available.

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Email us with the address to remove if newsletters are coming to multiple addresses. If duplicates are being received at the same email address, let us know to retain one of the addresses.

Thank you for your continuing support. Students attending our programs help support our graduate training programs and research projects. We hope to see you at a future training course.

Roy McKay, Ph.D.
Course Director
University of Cincinnati
www.DrMcKay.com

I hope you enjoy this newsletter. Dr. McKay volunteers his time to many standard setting organizations and governmental agencies. Dr. McKay does not receive public or private funding for these services. Therefore, donations are appreciated and help this practice to continue. The opinions in this newsletter are those of Dr. McKay and not the University of Cincinnati.

Click Here to Donate

For information about QualFit Software for qualitative respirator fit testing with sweet and/or bitter agents, go to www.QualFit.net

What is QualFit software?
12 minutes
https://youtu.be/RwdMfrQXdTY

Basic Operation of QualFit Software:
18 minutes
https://youtu.be/vfwfuVQkAKw

Comprehensive Fit Test Training Video
54 minutes
https://youtu.be/FxpVsm3OhLY

Respirator Fit Testing Errors and Solutions
- 21 minutes
https://youtu.be/0RsQEeOcS7o