Pulmonary Function Testing Newsletter August 2022

Featured Courses: **Spirometry Refresher (NIOSH-approved):**
September 20, 2022
Interpretation of Spirometry - Beyond the Numbers:
September 21, 2022

In the this issue:

Dangerous Spirometry Testing???

A colleague of mine with extensive spirometry testing knowledge and experience shared the following story with me.

She was told by a research physician that the three (3) spirometry efforts she administered on a study subject were "**dangerous**", even though they were the best 3 tracings he had seen in years.

Here's a summary of the test :

3 efforts were conducted.
All 3 tracings met ATS-ERS criteria for FEV_1 and FVC acceptability.
Repeatability criteria was achieved.
All three (3) tracings had FEV_1's within 50 mls of each other, exceeding criteria.
All three (3) tracings had FVC's within 50 mls of each other, exceeding criteria.
The reported FEV_1 came from the 2nd trial.
The reported FVC came from the 2nd trial.

Remember, repeatability criteria is 150 mls and all three tracings had FEV1's and FVC's within 50 mls.

The physician informed this experienced operator that she should have administered more trials and it was "dangerous" to stop at three. He said: "All of the other sites are routinely doing 5 - 7 trials."

These tests were conducted as part of a multi-center research study and the physician who made this statement was responsible for reviewing tests for this study. Need I say more?

2019 Spirometry Update - Errors, Omissions, and Clarifications

The 2019 ATS-ERS Spirometry Update is a thorough, but complicated guideline. It also has errors and omissions. To my knowledge, no follow-up publication has addressed errors and omissions in this guideline. Consequently, this Newsletter and future editions will periodically address errors, omissions and provide clarification. I'll also fill-in some of the gaps for tests that aren't conducted in hospital-based pulmonary function laboratories, such as workplace and primary care settings.

Start of Forced Expiration:

Page e77 of the 2019 Spirometry Update says:

> "To ensure that the FEV_1 comes from a maximal effort, the BEV must be <5% of the FVC ...)."

Regarding acceptability, Table 7 on page e79 says:

> "Must have BEV ≤5% of FVC ...".

So which is correct?

< (less than) 5%, or

≤ (less than or equal to) 5%

I believe the former is correct and the latter (Table #7) is incorrect. I base this on the following.

The previous (2005) Spirometry Standard had the following:

> "To achieve an accurate time zero and assure the FEV_1 comes from a maximal effort curve, the EV must be <5% of the FVC ...".

In addition, Table 5 of the 2005 Standard says that good starts have:

> "Extrapolated volume <5% of FVC ..."

Going back further, the 1994 Spirometry Standard said:

> "To achieve accurate "time zero" and ensure that the FEV_1 comes from a maximal effort curve, the extrapolated volume must be less than 5% of the FVC ...".

Given that the 1994 Update and the 2005 Standard both state "less that 5%", I believe Table number 7 in the 2019 Update is an error and the text on page e77 is correct.

> Note: The 1994 Spirometry Update and the 2005 Spirometry Standard use the abbreviation "EV" (extrapolated volume) whereas the 2019 committee uses "BEV" (back extrapolated volume).

Forced Expiratory Time of 6 Seconds:

While the 2019 Spirometry Update does clearly recommend no requirement for a minimum forced expiratory time (FET), it doesn't correctly state the 2005 position on this issue. Many spirometer manufacturers and their software have also incorrectly understood the 2005 requirement regarding FET and specifically a minimum FET of 6 seconds. Here's what the 2019 Update says:

> "The 2005 ATS/ERS requirement of a minimum FET (1) resulted in some valid maneuvers being classified as inadequate (77, 78, 85)."

As a member of the 2005 committee, I can clearly say it was **never a requirement** to have a forced expiratory time (FET) of 6 seconds for persons greater than 10 years of age. Here's what the 2005 Spirometry Standard said on this topic:

> "The volume-time curve shows no change in volume (<0.025 L) for ≥1s, and the subject has tried to exhale for ≥3 s in children aged < 10 yrs and for ≥6 s in subjects aged >10 yrs."

Notice the words "has tried". It doesn't use the words "must" or "required". It simply suggests that subjects older than 10 years of age should try and exhale longer than 6 seconds. It's not a requirement.

The 1994 Spirometry Update had a similar position. It said:

> "A minimum exhalation time of 6 s (length of maximum expiratory effort), unless there is an obvious plateau in the volume-time curve display, is required to obtain maximal FVC results. There are instances (e.g., the testing of children, young adults, and some restricted patients) where shorter exhalation times are acceptable."

Notice the word: "unless" and shorter times are "acceptable".

Historically, as a result of poor training and/or using spirometers that flagged tracings with expiratory times of 6 seconds or less, these tracings were judged to be unacceptable, even when a plateau was achieved. The purpose of 6 seconds was simply to help users understand that at least 6 seconds is commonly needed to complete a forced exhalation. It was never a requirement.

It's unfortunate the 2019 committee didn't extend an invitation to all previous committee members to participate in the revision process. Failure to do so, created a lost opportunity to understand the rationale for many of the earlier recommendations.

Why Never Smokers Develop COPD

When looking at the risk factors known to contribute to Chronic Obstructive Pulmonary Disease (COPD), smoking immediately comes to mind. However, only a minority of smokers go on to develop COPD. More surprising to some, is only a minority of heavy smokers develop COPD, suggesting other risk factors must come into play. These risk factors include second-hand smoke, airborne pollutants (environmental and workplace), and asthma. Yet, it is also well known that a substantial fraction of COPD risk is unknown. However, it's also known that approximately half of older adults with COPD have had a low baseline lung function, rather than accelerated decline is spirometry.

Abnormal lung development, specifically dysanapsis, has been suspected as a risk factor for COPD, which brings us back to low baseline lung function and specifically to a 2020 study published in *JAMA* by Smith and colleagues. This study examined the ratio of airway lumen diameter to lung volume, quantified by computed tomography (CT) of the lung.

Dysanapsis refers to a mismatch in the ratio of airway lumen diameter to lung size. In most people, when the lungs grow larger, the airways also grow larger in proportion to increasing lung size. In some people, the airways grow at a rate that is less or greater than expected, a condition called dysanapsis. The reason for this unequal or disproportionate rate of growth is not clear. Some abnormal or questionable spirometry testing may be caused by dysanapsis.

The study by Smith found that the reduction in airway lumen diameter to lung size was a strong risk factor for COPD and may explain why 30% of COPD can occur in people who never smoked. On the other hand, persons with an elevated airway diameter to lung size ratio, may be less susceptible to COPD and perhaps other airway disorders.

For additional information on this topic, go to the source:
Smith B, et al. Association of dysanapsis with chronic obstructive pulmonary disease among older adults. *JAMA*. 2020;323(22):2268-2280. doi:10.1001/jama.2020.6918

Spirometry Interpretation
Join us September 21, 2022 for our 1-day Interpretation of Spirometry course.
For details go to: www.DrMcKay.com

Screening for Chronic Obstructive Pulmonary Disease
US Preventive Services Task Force Reaffirmation Recommendation Statement

On May 12, 2022 the US Preventive Services Task Force (USPSTF) released a reaffirmation statement on the screening of Chronic Obstructive Pulmonary Disease (COPD). This is an update to the 2016 recommendation reviewed in my newsletter at that time. To update its 2016 recommendation, the USPSTF commissioned a reaffirmation evidence update that focused on targeted key questions for benefits and harms of screening for COPD in asymptomatic adults and treatment in screen-detected or screen-relevant adults. For the reaffirmation process, only a very high level of evidence would justify a change in the previous recommendation. In essence the new evidence must be of sufficient strength and quality to change its previous conclusions about the evidence.

This reaffirmation and subsequent recommendation was not taken lightly, especially since COPD is recognized as an irreversible reduction of airflow in the lungs. Progression to severe disease has a significant impact on quality of life and causes deterioration of lung function, which is measurable with a variety of pulmonary function tests, including spirometry. In 2020 it was estimated that approximately 6% of US adults had been diagnosed with COPD. Chronic lower respiratory disease, composed mainly of COPD, is the sixth leading cause of death in the US.

Age-adjusted death rates for COPD continue to be higher in men than women. However, they report the rates for men during the last 20 years are declining in men while the rates for women remain the same. This corresponds to the patterns of past smoking histories for men and women.

Using a reaffirmation process, the USPSTF concludes with moderate certainty that screening for COPD in asymptomatic adults has **no net benefit** and recommends against screening for COPD in asymptomatic adults. They give this recommendation a garde of D.

It's important to recognize that this USPSTF recommendation addresses the screening for COPD in asymptomatic adults (those without symptoms). These should not be confused with recommendations the American Thoracic Society, European Respiratory Society, and American College of Physicians, American College of Chest Physicians, that have guidelines recommending spirometry be used to diagnose airflow obstruction in patients **with** respiratory symptoms. The USPSTF recommendation applies to adults with**out** any respiratory symptoms such as chronic cough, sputum production, shortness of breath, or wheeze. It does **not** include persons with an inherited disorder that increases risk for COPD, such as alpha 1-antitrypsin deficiency or workers exposed to potentially hazardous airborne toxins at their workplace.

To Summarize: This 6-year follow-up to the previous USPSTF recommendation reaffirmed that screening is not recommended in patients without COPD symptoms. They suggest clinicians could be investing their time into introducing or guiding patients through smoking cessation protocols, because this would

potentially have greater effect on health than spending the time and money to screen asymptomatic patients for COPD. Issues for further research and gaps that need to be addressed include whether early treatment of patients with few or no symptoms of COPD is worthwhile, and whether early intervention with bronchodilators or inhaled corticosteroids could have adverse effects in these patients.

One final thought: To prevent COPD, the best thing to do is **don't** start smoking. For those that currently smoke, STOP.

For a copy of the US Preventative Services Task Force Reaffirmation Recommendation Statement, Click here, or go to JAMA. 2022;327(18):1806-1811. doi:10.1001/jama.2022.5692

Reader Questions:

Note: Due to time restrictions, Dr. McKay may not respond to all reader questions. However, selected questions and answers will be published in future newsletters.

Question:

"Can you tell me if we are supposed to send the calibration syringe out for a yearly check? We are doing the daily check?"

Answer:

The frequency differs depending upon the make and model of the syringe. Manufacturers have different recommended frequencies, some of which are every 1 year, every 2 years or every 3 years. The recommended frequency is commonly specified on the syringe itself or the paperwork that came with it.

Here's what the current (2019) spirometry standard specifically says: "Accuracy of ±0.015 L verified by manufacturer on delivery and at intervals recommended by the manufacturer".

Notice, it doesn't require this to be done yearly.

Replacing Start of Test Criteria

Question ???

An associate of mine said you recommend replacing the current start of forced expiration criteria with rise time. Is this true?

Answer:

No, this isn't what I said, but appreciate the opportunity to clarify. For decades, I've recommended looking at Flow-Volume tracing as an **additional** approach to evaluate if an initial maximal expiratory effort was provided, **not** as a replacement. With that clarification, of the seven (7) methods that could be used to evaluate the start of expiration, rise time to peak flow is easy to use and commonly available on many spirometry systems. Rise time to peak flow has several advantages and like some of the other methods, is not dependent upon events occurring later in the maneuver.

I have suggested replacement of the BEV as a percentage of the FVC (BEV%), with EV/FEV3 or EV/FEV6 ratios. When used in conjunction with rise time to peak flow or peak flow repeatability, I believe this will reduce variability in spirometry programs. Now that the 2019 Spirometry Update has changed criteria for the end of forced expiration (EOFE), the need to include additional approaches is of greater importance, especially for longitudinal evaluation of FEV1 and FVC.

Note: Due to time restrictions, Dr. McKay may not respond to all reader questions. However, selected questions and answers will be published in future newsletters.

Preserved Ratio Impaired Spirometry (PRISm) and Clinical Outcomes

In a December 2021 *JAMA* article, Wan and colleagues reported on the clinical outcomes associated with proportional reductions in expiratory lung volumes without airway obstruction. This concept is known as preserved ratio impaired spirometry (PRISm). PRISm is defined as the ratio of forced expired volume in the first second to forced vital capacity (FEV_1/FVC) greater than or equal to 0.70 with an FEV_1 less than 80% predicted. Notice these are not statistically derived lower limits of normal, but are none-the-less commonly used. In this retrospective study, the authors pooled data from nine (9) US general population-based cohorts (65,251 participants 18 to 102 years of age, of whom 53,701 participants had "valid" baseline lung function) conducted from 1971-2011. The authors used the word "valid" spirometry. For example, in the "Methods" section, they wrote: "Individuals with at least 1 valid spirometry examination were retained for

analysis; the first spirometry obtained was considered the baseline spirometry." I don't understand what the word "valid" means. It certainly isn't a term used in spirometry standards and they didn't distinguish spirometry parameters that met current acceptability or usability criteria. Regardless, the authors concluded that baseline PRISm, compared with normal spirometry was associated with a small but statistically significant increased risk for mortality and adverse cardiovascular and respiratory outcomes. They also stated further research is needed to explore whether this association is causal.

To read more about PRISm and how it may be used, you'll need to read the entire article. To get retrieve a copy, Click Here or go to JAMA, Dec 14, 2021, Vol 326, Num 22.

European Respiratory Society Guidelines for the Diagnosis of Asthma in Adults

New guidelines for the diagnosis of asthma in adults have been published February 15, 2022 (online) by the European Respiratory Society (ERS). Here's a copy of the abstract, from the ERS website:

> "Although asthma is very common affecting 5–10% of the population, the diagnosis of asthma in adults remains a challenge in the real world that results in both over- and under-diagnosis. A task force (TF) was set up by the European Respiratory Society to systematically review the literature on the diagnostic accuracy of tests used to diagnose asthma in adult patients and provide recommendation for clinical practice.
>
> The TF defined eight PICO (Population, Index, Comparator, and Outcome) questions that were assessed using the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) approach, The TF utilized the outcomes to develop an evidenced-based diagnostic algorithm, with recommendations for a pragmatic guideline for everyday practice that was directed by real-life patient experiences.
>
> The TF support the initial use of spirometry followed, and if airway obstruction is present, by bronchodilator reversibility testing. If initial spirometry fails to show obstruction, further tests should be performed in the following order: FeNO, PEF variability or in secondary care, bronchial challenge. We present the thresholds for each test that are compatible with a diagnosis of asthma in the presence of current symptoms.
>
> The TF reinforce the priority to undertake spirometry and recognize the value of measuring blood eosinophils and serum IgE to phenotype the patient. Measuring gas trapping by body plethysmography in patients with preserved FEV_1/FVC ratio deserves further attention. The TF draw attention on the difficulty of making a correct diagnosis in patients already receiving inhaled corticosteroids, the comorbidities that may obscure the diagnosis, the importance of phenotyping, and the necessity to consider the patient experience in the diagnostic process."

To obtain a copy use the following link:
https://doi.org/10.1183/13993003.01585-2021

or Click here

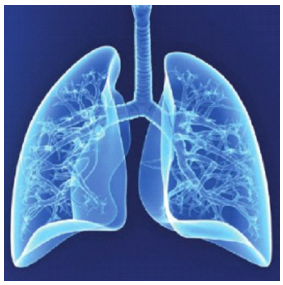
Reminder: Refresher Training Due Dates

If your last initial or refresher NIOSH spirometry training was in 2017, your re-certification **due date is 2022**.

Next Refresher course dates:

September 20, 2022

Airborne Transmissible Diseases - By the Numbers



Note: This article also appeared in my Respiratory Protection Newsletter. My apologies for presenting it again here.

The April and May issues of the AIHA publication *The Synergist*, report staggering numbers for three of the more common airborne transmissible diseases each year in the United States and globally. Here are the reported numbers:

1,700,000,000

1.7 Billion people infected globally in 2018 by *Mycobacterium tuberculosis*, the bacterium that causes tuberculosis (TB). Source: February 2022 report by the National Academies of Sciences, Engineering, and Medicine (refer to the article that follows).

13,000,000

Estimated number of people in the U.S. with latent TB infections.

1,500,000

1.5 Million deaths per year. Approximate number of TB-related deaths reported globally each year as reported by the CDC.

526

Number of deaths from TB reported in the United States for calendar year 2021.

1,000,000,000

1.0 Billion estimated number of influenza cases reported globally every year according to the World Health Organization (WHO).

4,000,000

Estimated number of severe influenza cases (3-5 million) reported globally every year.

290,000 - 650,000

Estimated number of influenza-related deaths globally per year.
Based upon my math, fatalities range between 0.03 and 0.07% of cases reported.

435,626,514

Cumulative number of confirmed cases of COVID-19 reported by the WHO, as of March 1, 2022. Obviously much higher now.

5,952,215

Cumulative number of COVID-19 deaths reported to the WHO as of March 1, 2022. Based upon my math, this represents 1.37% of confirmed cases.

Dr. McKay's Comment:

Think about these numbers. They're truly earth-shattering. Maybe it's time to re-think green, energy efficient buildings from a health perspective. For example, last year I had an opportunity to speak at a modern, energy-efficient, federally awarded green building. The risk for COVID was still a concern, but it wasn't possible to switch the ventilation fan to the "on" position (it stayed set to "auto"). Furthermore, I couldn't change the fan speed from low-to-high and couldn't open any windows. Other control measures were put in place, such as physical distancing, face coverings, etc., but it would have been desirable to improve ventilation. I gave my presentation wearing an N95 filtering facepiece respirator (FFR).

Recently (late June), I returned from Europe on a 3-legged flight. Face coverings were not required on any of the flights. On the 2nd (transoceanic) and 3rd (U.S. domestic) flights, I felt very comfortable and choose not to wear my N95 filtering facepiece respirator (FFR). For these two legs, I was fortunate to have premium seating. However, on the 1st leg of this adventure, the ventilation felt stagnant, especially during boarding. For this plane, seating was a 3 by 3 configuration in the main cabin and all seats were occupied. I didn't make a count, but rarely observed anyone wearing a face covering and coughing was heard periodically throughout the 2-hour flight. During this flight, everyone generally stayed in their seats and I wore my N95 FFR. However, none of these scenarios appeared as "risky" as time **between** flying. For the connecting flight in Europe, everyone was transferred from the terminal using buses. These buses were standing room only and sat on the tarmac for extended periods on time with doors closed. Standing shoulder-to-shoulder, packed like sardines; talking, laughing, coughing, and sneezing were all common occurrences.

Next, I entered passport control. Here the lines were extensive. Everyone was packed into what appeared to be a very poorly ventilated holding area with low ceilings. The room was hot and humid, and became worse over time. The increasing heat and humidity were obviously due to high occupancy in a poorly ventilated space. As the slowly moving lines of people switched back-and-forth, there was amble opportunity to share your space with people from other flights. While not exactly standing shoulder-to-shoulder, the spacing was tight, and became tighter as the lines grew longer. A true, international experience in a poorly ventilated area.

The next opportunity to share space was while taking the tram to another terminal for my departing flight. At first, the tram wasn't crowded, but then the masses arrived and became progressively more crowded. I questioned, why the tram didn't depart earlier. My guess is the tram must be able to count people. If the tram can comfortably hold 25 people, apparently, the doors don't close until the count exceeds 150. Once again, I found myself in a poorly ventilated, over-crowed space, standing shoulder-to-shoulder with friends around the world.

In summary, it appeared the risk of airborne transmission on the plane was much lower than the risk of air "travel". Next time you consider the safety of traveling on a plane, you may want to pay more attention to the over-crowed, poorly ventilated spaces on the ground before stepping onto the plane. My decision to selectively use respiratory protection was my choice. However, I

would have preferred better options.

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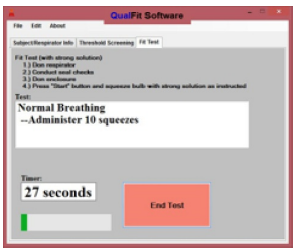

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Reminder: Refresher Training Due Dates

If your last initial or refresher spirometry training was in 2017, your re-certification **due date is 2022**.

Students who wish to maintain their NIOSH Spirometry certification must take a NIOSH-approved Refresher program **every 5 years**.

Our Next Refresher course date is:

September 20, 2022

OSHA News

Spirometry reminders for Silica Dust

When silica dust exposures are at or above the action level for 30 or more days a year, pulmonary function tests (spirometry) must be offered at least every three years to workers exposed at or above the action level for 30 or more days per year. When given:

1) The pulmonary function test must include measurement of forced vital capacity (FVC), forced expiratory volume in one second (FEV_1) and the FEV_1/FVC ratio.
2) Pulmonary function testing must be administered by a spirometry technician with a current certificate from a NIOSH-approved spirometry course.

It's a **violation** of the Silica Dust Standard if:

3) The person who administers the test, does so with a certificate from a NIOSH-approved course that has expired, which is five (5) years after the issue date.
4) The person who administers the spirometry test, does so under the guidance and training of another person who has a NIOSH-approved certificate, but does not have a NIOSH-approved certificate themselves.

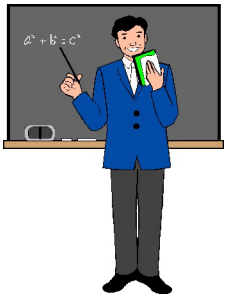
Recommendations for Employers:

5) If you use the services of an outside provider to perform spirometry testing for compliance with the Silica Dust Standard, request to see a copy of the NIOSH-approved training certificate(s) for those persons who will administer the spirometry testing..
6) Look at the spirometry report for your employees and periodically cross-check the identity of the person who administered the spirometry test with the list of names identified in item #5. Remember, it's the employer who's responsible for compliance with the Silica Dust Standard and it's the employer that will receive the citation, if the contractor provides spirometry testing services using someone that doesn't have a valid NIOSH-approved certificate.

Learn Respirator Fit Testing
Join us October 19-20, 2022 for a Respirator Fit Testing Workshop in Cincinnati. For details go to:
www.DrMcKay.com

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.

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, FEV_1, $FEF_{25-75\%}$.
* 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.

Note: Our refresher class is not a repeat of initial spirometry training. It's specifically designed to meet the needs of students who have previously attended a spirometry training program in the past.

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, please visit: www.DrMcKay.com

Spirometry Fundamentals Workshop 1-day

Contact us for next course date

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, FEV_1, FEV_1/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:
September 27-29, 2022 (wait list only)
November 15-17, 2022

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

Informal Spirometry Training
Want to improve spirometry training at your workplace? We offer a variety of on-site, informal training programs that vary from 4 - 7 hours in length.
If interested, send an email to info@DrMcKay.com

Remaining 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:
http://www.drmckay.com/interpretation-of-spirometry.shtml
September 21, 2022

NIOSH-Approved Spirometry
http://www.drmckay.com/niosh-course.shtml
September 27-29, 2022 (wait list only)
November 15-17, 2022

Spirometry REFRESHER (NIOSH-approved):
http://www.drmckay.com/spirometry-refresher.shtml
September 20, 2022

Overview of Respiratory Protection:
http://www.drmckay.com/rtc-overview.shtml
Oct 18, 2022

Fit Testing Workshop (2-day):
http://www.drmckay.com/rtc-workshop.shtml
Oct 19-20, 2022 (1 spot currently available)

Respirator Selection & Cartridge Change Out Schedule Workshop.
http://www.drmckay.com/rtc-resp_selection.shtml
May 2023 dates to be determined

Fit Testing Refresher & Advanced Topics
http://www.drmckay.com/rtc-resp-refresher-advanced.shtml
May 2023 dates to be determined

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.

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/vfwfuVOkAKw

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

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

QualFit™ Full Screen Option - 5 minutes
https://youtu.be/RJr-IIKTLas

The new full screen exercise option makes it easier for the test operator to visualize the exercise testing screens during the test procedure, even when standing 8 or more feet away. In addition, audio beeps and changes in font color help to ensure the aerosol is delivered at the proper time and sequence as required by OSHA, ANSI, ASTM, ISO and other organizations.

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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