



The Thoracic Society
of Australia & New Zealand
LEADERS IN LUNG HEALTH

STANDARDS FOR SPIROMETRY TRAINING COURSES COMPANION DOCUMENT TO STANDARDS FOR THE DELIVERY OF SPIROMETRY FOR COAL MINE WORKERS

Thoracic Society of Australia and New Zealand

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Glossary

ANZSRS	Australian and New Zealand Society of Respiratory Science
ATS	American Thoracic Society
BTPS	Body temperature, ambient pressure saturated with water vapour
CRFS	Certified Respiratory Function Scientist
ERS	European Respiratory Society
FEV ₁	Forced Expiratory Volume in one second
FVC	Forced Vital Capacity
LABA	Long-acting Beta Agonist
SABA	Short-acting Beta Agonist
TSANZ	Thoracic Society of Australia and New Zealand

Definition

WORKER	A coal mine worker presenting for a health assessment
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Background

This document has been developed to accompany the *TSANZ Standards for Delivery of Spirometry for Coal Mine Workers*¹. The completion by spirometry operators of a spirometry training course that meets this standard is required in order to achieve compliance with the Standards for Delivery. This document has been developed specifically for use in an accreditation program for spirometry training courses conducted as a requirement for compliance with *TSANZ Standards for Delivery of Spirometry for Coal Mine Workers*. It draws on the best evidence and is consistent with the recommendations of both TSANZ and ANZSRS with respect to minimum requirements for training in spirometry². As a minimum, spirometry training course content must adhere to the current international ATS/ERS pulmonary function standards for general considerations for lung function testing³, spirometry testing⁴ and interpretation⁵.

Introduction

An independent review of the respiratory component of the Coal Mine Workers' Health Scheme⁶ (the Scheme) was undertaken by Monash University in response to the re-emergence of coal workers' pneumoconiosis (Black Lung Disease) in Queensland. The review was published in July 2016 and, with respect to spirometry testing, concluded that:

*Overall, the reported quality control and assurance of spirometry testing needs to be improved. For example, although 79% of spirometers were reported to have had a calibration check, most (66%) had not been calibrated in 2016. This is a significant inadequacy considering devices used in the study require daily calibration checks. ... a majority of the spirometry performed under the scheme is likely to be of poor quality and more ongoing training and quality assurance is needed to reach accepted standards.*⁶

This document defines:

1. Core components of spirometry training under the following headings:
 - 1.1 Overview of spirometry
 - 1.2 Personnel
 - 1.3 Equipment management, including calibration and quality control
 - 1.4 Infection prevention
 - 1.5 Conducting the test/measurement
 - 1.6 Interpretation and reporting
2. Course delivery modes
3. Course duration
4. Frequency of refresher training
5. Qualifications and staff ratios of course providers
6. Assessment requirements

1. Core components of a spirometry training course

1.1 Overview of spirometry

Operators are required to understand the purpose of spirometry and to be aware of relevant best practice standards. Training must include:

- An explanation of what spirometry is with reference to the ATS/ERS standards for general considerations for lung function testing², spirometry testing³ and interpretation⁴
- Definitions of spirometric indices (e.g. FEV₁, FVC, FEV₁/FVC)
- Understanding volume time and flow volume curves
- Explanation of BTPS conditions for reported values
- Understanding reference values including:
 - o definitions
 - o the use of the lower limit of normal and percent predicted
 - o limitations of reference equations and the importance of ethnicity

1.2 Personnel

Training providers will provide participants with a log book for recording spirometry.

1.3 Equipment management, including calibration and quality control

Training will ensure the following items are addressed:

- Minimum requirements for spirometers that meet ATS/ERS standards³ including performance requirements, calibration procedures, reporting reference values and values expressed in BTPS conditions^{3,4}
- Calibration and verification definitions
- Frequency of calibration and/or verification
- Spirometer accuracy in accordance with ATS/ERS standards, using a calibrated, certified 3L syringe at variable flows³
- Preventative maintenance
- Conducting biological controls
- Managing new software versions
- Trouble shooting equipment

Training must ensure that participants are able to develop and maintain an equipment maintenance log that includes:

- Equipment history – with noted use and any changes in hardware, software and prediction equations
- Equipment calibration and verification records, including error reports and resulting preventative maintenance
- Biological control record and calculated “normal” ranges

1.4 Infection prevention and medical emergencies

Training must address infection prevention and management of medical emergencies or adverse events arising from spirometry. The training must include the following components:

- Regular equipment cleaning
- Hand-washing hygiene between workers and following equipment handling
- Single-use versus reusable consumables
- Use of viral/bacterial filters and spacers
- Use of personal protective equipment (e.g. gloves)
- Understanding local protocols for medical emergency management
- Understanding of management of the infectious worker

1.5 Conducting the test/measurement

The training should cover all steps set out in the Standard⁵ as follows:

Step 1. Determine the test indication and any contraindications

Training must address:

- Pre-appointment instructions relating to the use of SABA or LABA
- Indications and contraindications to testing
- Management of communicable disease

Step 2: Equipment preparation

Training must address:

- Checking equipment is correctly set up and calibrated/accuracy check is conducted where required
- Attachment of mouthpieces and/or filters

Step 3: Worker preparation

Training must address:

- Importance of accurate recording of worker’s height, weight, age, gender and ethnicity
- Worker posture during testing
- How to explain and demonstrate the test

Step 4: Conducting the test

Training must address:

- Performance of the test as per the ATS/ERS standards for spirometry³
- Acceptability and repeatability criteria³
- Identifying manoeuvres that meet acceptability and repeatability criteria
- Reversibility assessment including choice of bronchodilator, withholding times, method of administration and time to peak efficacy
- Troubleshooting instrument errors
- Troubleshooting worker manoeuvres to achieve acceptability and reproducibility criteria and identifying common causes of unacceptable manoeuvres

Steps 5 & 6: Finalising the test and operator comment

Training must address:

- When testing is complete in terms of maximum number of test attempts or when acceptability and repeatability criteria are achieved³
- Selection of suitable reference equations
- Selection of best test data for reporting purposes
- Technical comments to describe test quality

1.6 Interpretation and reporting

Training must address:

- Quality of test statement
- Algorithm for interpretation in the Standard⁵ including:
 - o Pattern recognition: Normal; Obstructive; or Restrictive pattern
 - o Assessing severity of obstruction
 - o Bronchodilator response
- Longitudinal monitoring
- Limitations of spirometry - when other tests may be required or referral pathways
- Reporting and storing results

2. Course delivery modes

Spirometry training courses may be face-to-face, or a mixture of e-learning knowledge modules combined with face-to-face practical modules which will include faculty supervised test performance and selection and interpretation of the reported results. Purely online delivery is not acceptable as it does not allow for hands-on practical training.

3. Course duration

For face-to-face delivery, a minimum of 10 hours training is required, of which at least 60 percent must be practical hands-on training.

For mixed delivery methods, in addition to e-learning modules which can be completed at the trainee's own pace, at least six hours of practical face-to-face training is required.

4. Frequency of refresher training

It is important to note that there is strong evidence that the quality of spirometry improves with regular performance of the procedure and where operators have access to ongoing support and feedback after completion of training. Refresher training ensures that operators remain abreast of changes in technology and research in the field.

A one day refresher course must be attended within twelve months after the successful completion of the initial training course and then completion of an additional one day refresher course is required every three years thereafter.

Refresher courses should be tailored to review the content of this document with participants and focus on practical skills. As such the course will be one day in duration (eight hours of training) and should be approximately 50 percent theoretical review with updates to standards and best practice as required and 50 percent practical.

5. Qualifications and staff ratios of course providers

Spirometry training courses should be co-ordinated and run by a suitably respiratory qualified person(s) with substantial experience in the theoretical and practical aspects of spirometry measurement and interpretation. The onus is on the provider to demonstrate this to the accrediting body. A respiratory scientist who has passed the Certified Respiratory Function Scientist (CRFS) examination and has at least five years of experience in a TSANZ accredited respiratory function laboratory would meet these criteria.

At least one qualified staff member with a dedicated practical station that includes an ATS/ERS approved spirometer must be available for every five trainees during the practical components.

6. Assessment requirements

Assessment should comprise direct observation of the correct conduct of spirometry as well as written theoretical components. A pass mark is required for the theoretical components of the course.

Post course assessment in the workplace is also required before a trainee can complete the course. This assessment should be both theoretical and practical and will include completion of at least ten spirometry tests in the workplace for review by the course provider. A certificate of completion may only be issued when the participant has correctly completed workplace spirometry tests and has completed the theoretical assessment.

The course provider is required to provide participants with a Certificate of Completion and to maintain records of participant enrolment and completion of both initial and refresher training.

Evaluation of compliance with this standard

Training providers will demonstrate compliance with this standard as follows:

- The core components of spirometry training will address the mandatory content detailed in this document.
- Participants will be provided with a log book to record their spirometry practice in the workplace (proformas are available from TSANZ).
- Training must be structured to cover the mandatory components, and may be delivered either as 1: a minimum of 10 hours face-to-face of which at least 6 hours must be practical, or 2: online delivery for the theoretical component and at least 6 hours of face-to-face practical.
- Refresher training program will address updates to standards and provide a practical refresher. The refresher training will be 50 percent practical and 50 percent theoretical.
- The provider must demonstrate that the course is being delivered by a suitably respiratory qualified person with substantial experience in the theoretical and practical aspects of spirometry measurement and interpretation.
- At least one qualified staff member with a dedicated practical station that includes an ATS/ERS approved spirometer is available for every five trainees during the practical components.
- Post course assessment in the workplace is required and will comprise of theoretical assessment and at least ten correctly performed spirometry tests.

References

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