

Standard Operating Procedure

Professional Supervision of Exercise Testing at PERFORM

PC-SOP-GA-005-v01

Revision History

Version	Reason for Revision	Date
01	New SOP	April 10, 2015

Summary

The content of this standard operating procedure (SOP) provides guidelines for establishing the required level of professional supervision during physical activity and exercise testing to ensure the wellbeing and safety of participants.

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I. Definition of Terms

PERFORM	The PERFORM Centre at Concordia University.
Clinical Exercise Testing	<p>Exercise testing is a noninvasive procedure that provides diagnostic, prognostic, and therapeutic information as well as evaluates a patient's capacity for dynamic exercise.^{1,2}</p> <p>Standard graded exercise (GXT) used clinically to assess a patient's ability to tolerate increasing intensities of aerobic exercise while monitoring if any manifestation of myocardial ischemia, hemodynamic/electrical instability, or other exertion-related signs or symptoms occur.</p>
Prognostic Exercise Testing	Exercise test performed for the evaluation of disease severity among individuals with known or suspected cardiovascular disease (i.e., the risk of identifying adverse events). ¹
Physical Activity	A bodily movement produced by the contraction of skeletal muscles that result in a substantial (>1 metabolic equivalent or MET, a measure expressing the energy cost of physical activities) increase in caloric requirements over resting energy expenditure. ²
Physical Exercise	A type of physical activity consisting of planned, structured, and repetitive bodily movement done to improve and/or maintain one or more components of physical fitness. ²
Qualified Exercise Physiologist	A university-trained exercise physiologist with advanced training and certification. ²¹
Primary Prevention	Seeks to prevent the onset of specific diseases via risk reduction: by altering behaviors or exposures that can lead to disease, or by enhancing resistance to the effects of exposure to a disease agent. ²⁶
Secondary Prevention	Includes procedures that detect and treat pre-clinical pathological changes and thereby control disease progression. ²⁶
Tertiary Prevention	Seeks to soften the impact caused by the disease on the patient's function, longevity, and quality of life. Examples include cardiac rehabilitation following a myocardial infarction, seeking to alter behaviors to reduce the likelihood of having another cardiac event. ²⁶

2. Relevant Documents

This SOP is governed by the following Concordia University policies, SOPs, and PODs:

- ***PC-SOP-GA-007 “General Access to PERFORM Centre”.***
- ***PC-POD-CF-001 “Clearance for Physical Activity at PERFORM”.***
- ***Pertinent area SOP used for physical activity or area testing.***

3. Introduction

3.1 *Physical Activity vs. Exercise*

The terms “physical activity” and “exercise” are often used synonymously, however, they each possess a unique definition. Physical activity, as defined by the American College of Sports Medicine (ACSM), is any “bodily movement produced by the contraction of skeletal muscles that result in a substantial increase in caloric requirements over resting energy expenditure”, whereas, exercise is defined as “a type of physical activity consisting of planned, structured, and repetitive bodily movement done to improve and/or maintain one or more components of physical fitness”.² The variety of physical activities conducted at PERFORM warrants the development of a common and fair set of standards and requirements for all users at PERFORM.

3.2 *Exercise Testing*

Exercise testing is a noninvasive procedure that provides diagnostic and prognostic information, and assesses an individual’s capacity to tolerate increasing intensities of aerobic exercise.¹ Several types of exercise testing protocols exist, yet regardless of the range of testing procedures performed and the environment in which these tests are executed (i.e., hospital, clinic, research facility, or general public exercise settings), basic equipment, trained personnel, and protocol criteria are necessary to ensure the comfort and safety of the participant and to conduct a meaningful exercise test.³ At PERFORM, for instance, maximal and submaximal exercise tests can be performed in the general public and research setting (i.e., conditioning floor, cardio-pulmonary suite, etc.) to develop individualized exercise programs, to evaluate change in cardiorespiratory fitness over time, and/or to test a specific cohort’s exercise capacity as part of a research project. The testing

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variety conducted at PERFORM warrants the development of a common and fair set of standards and requirements for all users of the exercise testing equipment and space at PERFORM.

4. Rationale

The risk of having a cardiovascular event (i.e. cardiac arrest, myocardial infarction) during moderate intensity physical activity is very low in apparently healthy individuals.² The risk of mortality is thought to be less than 0.01/10 000 participant-hours, although the risk is slightly greater when performing vigorous activity and when inactive individuals become active.²¹ The health benefits of regular physical activity and exercise, however, far outweigh the associated risks.²² Such benefits include improved fitness, reduced blood pressure, reduced inflammation, decreased anxiety and depression, improved cognitive function; to name a few.²

Although exercise tests are considered to be safe, the potential for adverse events and its risk varies with the cohort being tested.^{3,1} Among large series of subjects undergoing exercise testing, the risk of serious complications requiring hospital admission, experiencing an acute myocardial infarction and sudden cardiac death during or immediately post exercise have been reported to occur in $\leq 0.20\%$, 0.04% , and 0.01% , respectively.^{2,4,5} Among asymptomatic low-risk subjects tested at a single institution, Gibbons et al.⁴ reported only 5 major complications and 1 death among 70 000 subjects (overall event rate, 0.8 per 10 000 tests), with no complications or deaths in the most recent 45 000 subjects. Although, adverse events are rare, it is essential that individuals supervising exercise tests must have the necessary cognitive and technical skills to safely administer an exercise test, thus, minimizing participant risk.⁶

Since the PERFORM Centre does not have direct medical oversight available, the primary objective of this document is to provide a set of standards for the required level of professional supervision during physical activity and exercise testing to ensure the wellbeing and safety of participants.

5. Pre-participation health screening

Current evidence showing the relationship between identifiable risk factors, the incidence of cardiovascular disease, and the triggering factors for acute MI suggests that pre-participation health screening is both reasonable and prudent.^{2,7} In line with this, it has been recommended that individuals interested in initiating an exercise training program or performing an exercise test should be screened at minimum by self-reported medical history and health risk appraisal questionnaire such as the PARQ⁺^{2,8,9} for the presence of risk factors for various cardiovascular, pulmonary, and metabolic diseases as well as other health conditions (e.g., orthopedic limitations) that require special attention^{2,10,11} in order to 1) optimize safety during exercise testing; and 2) aid in the development of a safe and effective exercise prescription.^{2,12}

“PC-POD-CF-001 - Clearance for Physical Activity at PERFORM” describes PERFORM’s pre-exercise health screening procedures that shall be applied to all potential exercise testing participants as a means of identifying an individual’s level of risk for an exercise-related cardiac event as illustrated in **Figure 1**. Accordingly, the health appraisal questionnaires shall be interpreted by a qualified exercise physiologist to adequately determine a subject’s level of risk for adverse event during exercise testing and training¹³ (**Figure 2**) as well as the appropriate level of professional supervision required during exercise testing and/or exercise program participation (**Figure 3**).

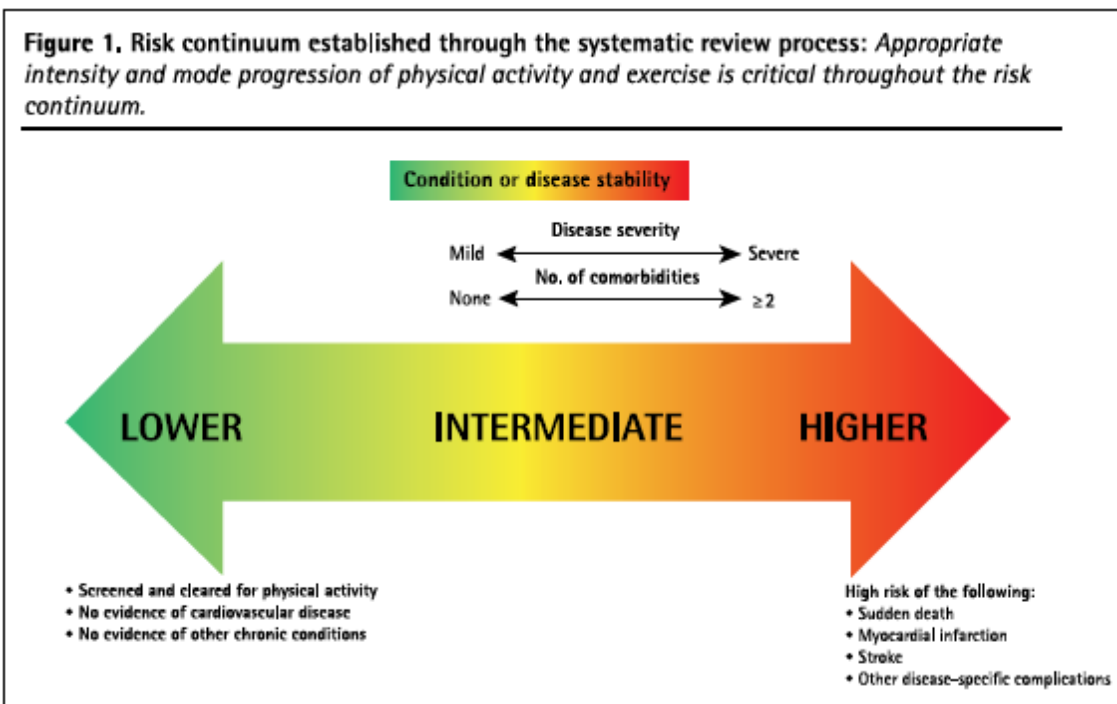


Figure 1. Evidence-based risk continuum from Bredin SS et al. Can Fam Physician 2013; 59:273-277.¹²

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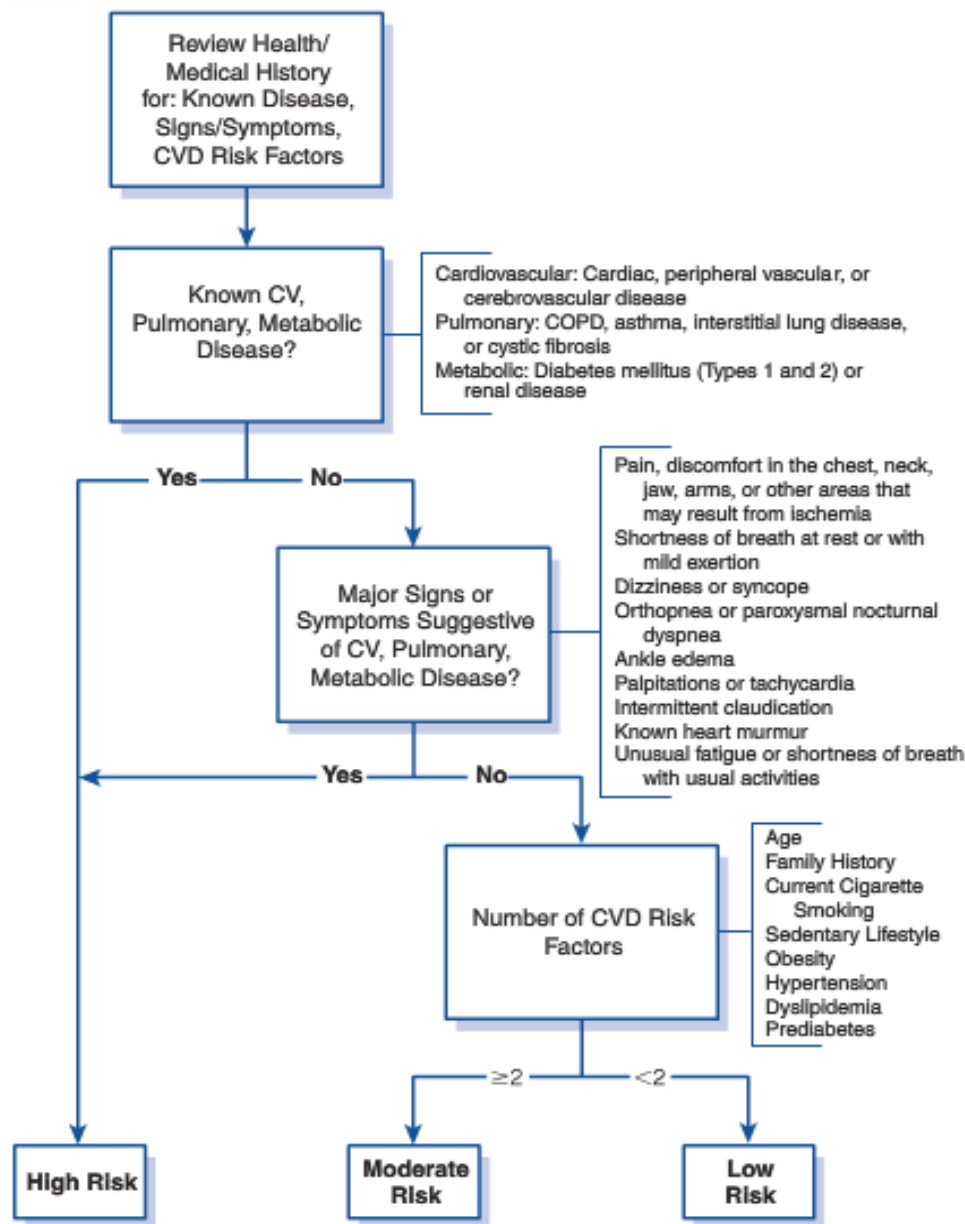


Figure 2. Logic model for classification of risk. CV- cardiovascular, CVD- cardiovascular disease. Taken from ACSM.²

The current document complements the “PC-POD-CF-001 - Clearance for Physical Activity at PERFORM” by the means of providing the procedures for establishing the adequate professional supervision required during physical exercise and exercise testing with the aim of ensuring the wellbeing and safety of participants.

* PERFORM has chosen to incorporate a recently updated version of the PARQ, identified as PARQ+ , thus making the latter to be used for pre-exercise screening.

6. Level of professional supervision required during exercise testing

The degree of professional supervision during exercise testing varies from “physician-supervised test” to “no physician present” according to an individual’s risk of a cardiac event.¹⁴

There is evidence suggesting that the use of trained non-physician healthcare professionals is appropriate to supervise clinical exercise testing, if the individual supervising the test meets competency requirements for exercise test supervision,¹⁵ is fully trained in cardiopulmonary resuscitation, is overseen by a physician skilled in exercise testing who is immediately available and later reads over the test results.¹⁵ Personnel and/or users of PERFORM involved in conducting exercise testing must have received training in basic life support and/or advanced cardiac life support (ACLS)¹⁴ if direct medical supervision by a physician is not always provided. Training in ACLS is strongly recommended for personnel conducting clinical/maximum exercise testing.¹

The level of professional supervision necessary during exercise testing and/or clinical exercise testing for the individual participant is primarily dependent on the health status of the participant being tested as well as the type (clinical vs. fitness) of exercise test conducted. The exercise testing supervision recommendation, found in **Figure 3**, reflects the notion that the risk of cardiovascular events increases as a direct function of exercise intensity (i.e., vigorous > moderate > light intensity exercise) and the number of CVD risk factors.²

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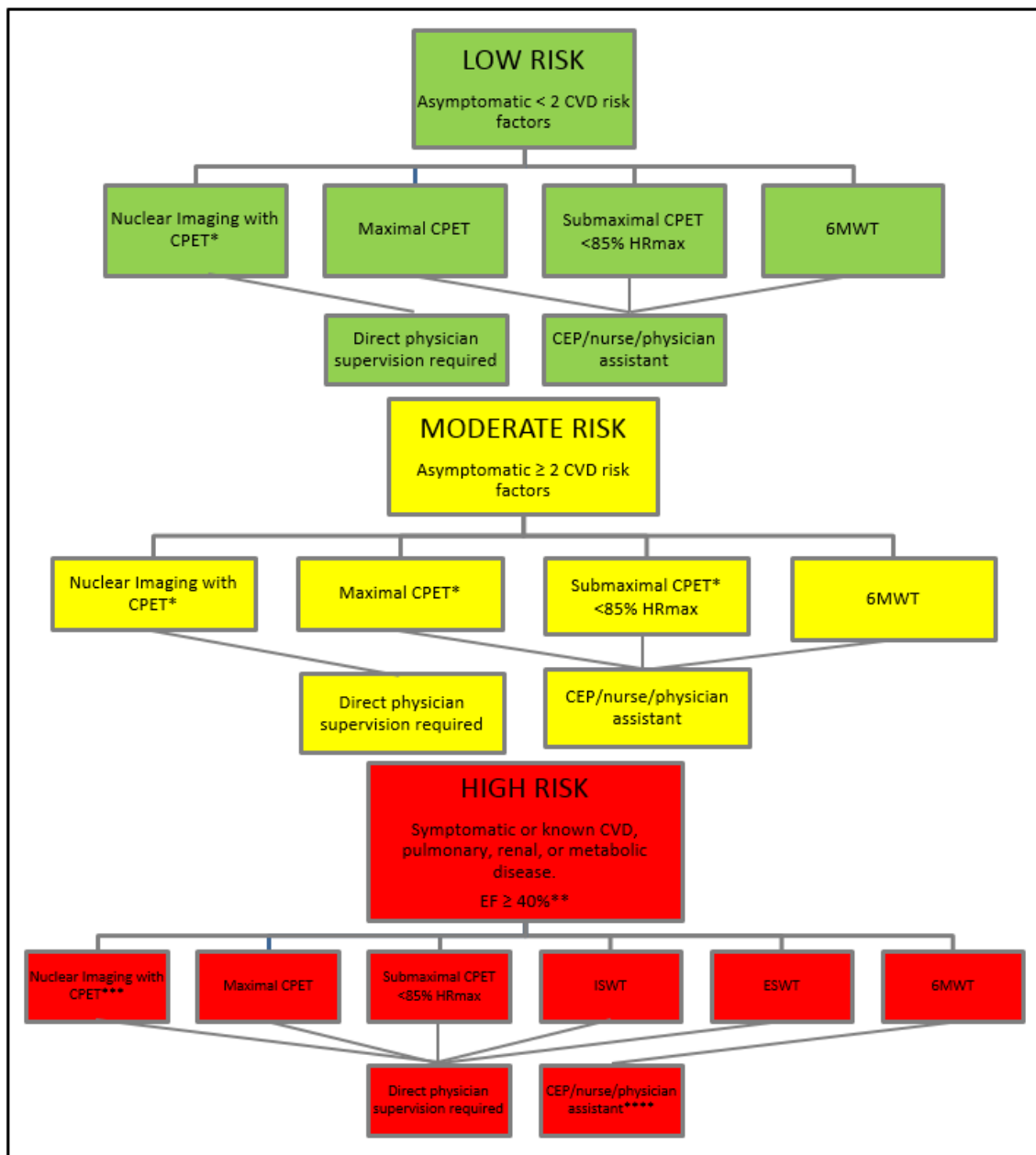


Figure 3. Professional supervision during exercise test requirements. CEP = Clinical Exercise Physiologist; CPET = Cardio-pulmonary exercise test; ISWT = Incremental shuttle walk test; HR = heart rate; ESWT = Endurance shuttle walk test; 6MWT = 6-minute walk test; CVD = cardiovascular disease.

* = May proceed if a medical exam has been previously performed.²

** = Will not be testing individuals with EF < 40% at PERFORM.

*** = Testing conducted for diagnostic purposes will not be performed at PERFORM.

**** = Physicians are not required to be present during all tests. The physician ordering the test or a supervising laboratory physician may decide whether physician attendance at a specific test is required.²⁵

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Figure 3 indicates that 1) for relatively low-risk individuals with less than two cardiovascular risk factors, tests may be directly supervised or conducted by properly trained healthcare professionals and/or graduate students as indicated in the skills & professional responsibility section of the current document; 2) the level of supervision required for moderate-risk participants (individuals with 2 or more cardiovascular risk factors) varies with the risk-level of the test. Current evidence^{1-3,7,16} recommends that a properly trained healthcare professional can conduct both a maximum and submaximal exercise testing and directly monitor patient status throughout testing and recovery in such individuals, with the a physician who is immediately available; and 3) in higher-risk individuals (signs and symptoms of or known cardiovascular/pulmonary disease), direct physician supervision during both submaximal and maximal exercise tests is recommended^{2,7,14,16}. Furthermore, individuals with known CVD may be further stratified regarding safety during exercise testing using the risk stratification criteria from the American College of Cardiology/American Heart Association (ACC/AHA)⁷ as well as the PAR-Q⁺ Collaborator recommendations for physical activity clearance¹⁷⁻²⁰.

NOTE: In the event of unclear case of risk level for a cardiovascular event, the level of supervision required during the test will ultimately be determined by the appropriately trained physician overseeing the exercise laboratory.¹⁶ Equally important is the consideration is the professional judgment of the trained non-physician healthcare professionals who is conducting the test.

7. Level of professional supervision required during physical activity

The level of professional supervision required may be determined by the qualified exercise professional after evaluating the information obtained from the pre-participation screening and evaluation tools, which may include the following:

- health screening
- medical evaluation, and/or
- exercise stress test results.²

These tools assist in determining a participant's level of risk, defined as the participant's acute or short-term risk of having a cardiovascular event.²³

The level of professional supervision during physical activity should directly reflect:

- the risk stratification level of participants²³
- the specific type of population being dealt with (healthy vs. compromised)²³

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The level of risk may be the main criterion for determining the level of supervision, however, other factors such as physical layout of the exercise area and the availability of prompt assistance will modify the staffing ratio.²³

Should a change in health status occur (e.g., signs/symptoms), or other evidence of progression/regression, and on occasion when the prescribed intensity increases, the level of supervision required may change.²⁴

8. Skills & professional responsibility

Personnel involved in management of delivery of exercise testing must meet academic and currently accepted professional standards in the field should be certified as recommended by relevant professional organizations, which tests the knowledge, skills, and abilities of the individual, and has the appropriate work experience.^{2,6,7,14}

PERFORM exercise professionals are required to be certified at a level of basic life support cardiopulmonary resuscitation (CPR), and have automated external defibrillator (AED) training. PERFORM in accordance with ACSM requires that one or more coordinators be certified in first aid.²

The PERFORM standards regarding professional skills required to supervise and/or conduct exercise testing are in accordance with the professional organizations involved with exercise testing including Canadian Society for Exercise Physiology, Canadian Cardiac Rehabilitation, American College of Sports Medicine, and ACC/AHA (for more details refer to PC-SOP-CP-001).

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Cognitive skills required to competently supervise exercise tests

1	Knowledge of appropriate indications for exercise testing
2	Knowledge of alternative physiologic cardiovascular tests
3	Knowledge of appropriate contraindications, risk, and risk assessment of testing
4	Knowledge of promptly recognize and treat complications of exercise testing
5	Competence in CPR and successful completion of advance cardiovascular life support and renewal on a regular basis
6	Knowledge of various exercise protocols and indications for each
7	Knowledge of basic cardiovascular and exercise physiology including hemodynamics response to exercise
8	Knowledge of cardiac arrhythmia and the ability to recognize and treat serious arrhythmias
9	Knowledge of cardiovascular drugs and how they can affect exercise, performance, hemodynamics and the ECG
10	Knowledge of the effect of age and disease on hemodynamics and the ECG response to exercise
11	Knowledge of principles and details of exercise testing including proper lead placement and skin preparation
12	Knowledge of endpoints of exercise testing and indication to terminate exercise testing

Table 1. Cognitive skills required to competently supervise exercise tests. Adapted from Rodgers G. et al. ⁶

NOTE: The current document has been developed based on the existing statements from the American College of Cardiology/American Heart Association (ACC/AHA)⁷, and the American College of Sports Medicine (ACSM) 2014 guidelines. These standards have been reviewed by researchers and clinicians in the field.

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APPENDIX I

SOP Training Record Form

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SOP Title

Professional Supervision of Physical Activity and Exercise Testing at the PERFORM Centre

SOP Code

Ownership	Document type	Area	SOP Number	Version
PC	SOP	GA	005	V01

Training Record

Full Name	
Institution	
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Signature

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Date