STANDARDS ON PROVISION OF ELECTROCARDIOGRAPHY STRESS TESTING

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Treadmill Services Workgroup

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1. The MOH Clinical Practice Guideline (CPG) on “Screening for Cardiovascular Disease and Risk Factors” was issued to all practising doctors in Mar 2011. Electrocardiography Stress Testing (i.e. treadmill services) in clinics should be offered in accordance with the CPG and that the treadmill ECGs should be interpreted by cardiologists.

2. However, concerns were raised by the general medical community as to whether EST might be increasingly used in general health screening of low-risk patients. This would then not be in line with the MOH CPG and would constitute “over-servicing”.

3. EST is one of the preliminary tests done to assess risks of coronary heart disease and determine if the patient requires angiography/angioplasty. Hence, indiscriminate use of EST could indirectly subject more patients to unnecessary invasive angiography and angioplasty.

4. Hence, the Treadmill Services Workgroup was appointed by DMS in June 2014 to look into the issue and standards of treadmill practice. The Workgroup, chaired by Dr Ong Hean Yee, has developed the standards to provide better clarity as well as to assist all doctors providing EST services to meet with the current standards.
1. **Introduction**

1.1 This document sets out the Standards on Provision of Electrocardiography Stress Testing (EST) to ensure appropriate and safe care for patients undergoing EST. It covers key areas such as patient selection, equipment and facility, specific requirements on personnel and training, and quality assurance and documentation.

2. **Definition**

2.1 EST refers to the procedure of subjecting a patient to physiological stress in order to elicit evidence of ischemic heart disease, arrhythmias and/or to assess cardiac functional status. The physiological stress may be applied by subjecting the patient to physical stress either using a treadmill or an ergometer.

2.2 EST should only be conducted after a comprehensive assessment of a patient which includes but is not limited to, clinical examination, evaluation of the patient’s medical history, assessment of cardiovascular risk factors and calculation of the patient’s cardiac risk score (see Part 3 below). It should be supervised by trained personnel in a facility equipped with the appropriate equipment to deal with any emergency that might arise (see Parts 4 and 5 below).

3. **Patient Selection**

3.1 The doctor shall ensure that patients who are selected to undergo EST must have a clinical risk assessment and/or a cardiac risk score. Therefore, prior to performing EST, the supervising doctor shall check the patient’s history, examine the patient and review the resting ECG, to exclude any unstable condition(s) that might be present for which EST is contraindicated or inappropriate.

3.2 The selection of patients for EST should be in line with the current local or international guidelines such as but not limited to American Heart Association/ American College of Cardiology / European Society of Cardiology.

3.3 Should EST be offered to any patient who does not satisfy the recommended patient selection criteria listed in 3.2 (including patients who have requested EST), the doctor shall inform the patient that he does not fall within the recommended patient selection criteria and consent shall be taken from the patient. The signed copy of this acknowledgment should be kept in the patient’s medical records.

4. **Equipment and Facility**

4.1 The equipment used for EST should comprise all of the following:
(a) A motorised treadmill/braked ergometer capable of providing measured increases in speed and gradient in accordance with the test protocol. Treadmills shall have at least a front rail and be fitted with an emergency stop button;
(b) A suitable 12-lead electrocardiograph (ECG) recording system capable of continuous monitoring; and
(c) Blood pressure (BP) monitoring.

4.2 The EST equipment used must be registered with HSA under the Health Products Act.

4.3 The EST equipment must be serviced on a regular basis according to the manufacturer’s instructions.

4.4 There should be sufficient space within the room adjacent to the treadmill/ergometer to facilitate CPR in the event of an emergency. There should also be easy access for a standard ambulance patient trolley for the purpose of patient evacuation in the event of an emergency.

4.5 All EST facilities must be equipped to provide basic life support in the event of complications and cardiac arrest. The doctor shall ensure that the EST facility is, at minimum, equipped with the following emergency equipment:

(a) Defibrillator – A portable external automated defibrillator is recommended for ease of use by all staff. It must be easily manoeuvred into place for easy defibrillation within the room;
(b) Bag-valve mask;
(c) Oropharyngeal airways; and
(d) Intra-venous sets.

4.6 All emergency equipment must be checked regularly and maintained in a state of readiness should emergencies arise.

4.7 The doctor shall also ensure that the following drugs are kept for emergencies within the premises:

(a) IV Atropine;
(b) IV Lignocaine or IV Amiodarone;
(c) Sub-lingual nitroglycerine tablet or spray;
(d) IV Adrenaline;
(e) Aspirin;
(f) IV Normal saline (0.9%) solution or IV 5% Dextrose saline solution;
(g) Inhaled Bronchodilator

4.8 All drugs must be dated and checked on a regular basis.
5. **Specific Requirements on Personnel and Training**

5.1 All personnel, including both the supervising doctor and the personnel performing the EST, must be familiar with their roles and be suitably trained and qualified to ensure the proper monitoring of patient health status and the management of any emergencies. The roles, qualifications and training requirements are summarised in Table 1 below. The licensee and/or doctor should ensure proper documentation and records of such training conducted and qualification documents.

**Table 1: Summary of the roles, qualifications and training requirements for specific personnel:**

<table>
<thead>
<tr>
<th>Personnel Involved in Performing EST</th>
<th>Roles</th>
<th>Qualification Requirements</th>
<th>Training Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervising Doctor</td>
<td>To oversee the operation and provision of EST services. Must be in close proximity (within the vicinity) to be called upon to do resuscitation in the event of an emergency. Able to use the drugs and devices listed above in Para 4.1, 4.5 and 4.7</td>
<td>The doctor must complete a MOH-approved course¹ unless he/she is a: - Specialist in cardiology/respiratory/sports medicine; or - Family physician with MMed (Family Medicine); or - Designated Medical Officer and above by the Department within the public hospital</td>
<td>BCLS certified Trained in AED use. Additional training in ACLS is optional. Must be trained and proficient in the use of EST equipment.</td>
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¹ One example of such a MOH-approved course is *Understanding The Standards on Provision of Electrocardiography Stress Testing (EST) – A Short Course on Meeting the New Requirements* organised by the Academy of Medicine, Singapore.
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<td>EST Performing Staff (who can be a Doctor/ Nurse/ Medical Technologist/ suitably trained assistant)</td>
<td>Must be with the patient in the exercise room during the EST at all times in order to ensure patient safety</td>
<td>-</td>
<td>CPR and AED-certified Supervising doctor must ensure that staff is proficient in the use of EST equipment. For instance, staff should know when and how to terminate the exercise. If they are not proficient in analysing ECG rhythms, then the Supervising Doctor should be present for each test.</td>
</tr>
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5.2 The final interpretation and reporting of EST tests must be performed by a cardiologist; or a doctor who has documentation that he or she had co-reported a minimum of 200 EST results with a cardiologist as part of EST training.

6. Quality Assurance and Documentation

6.1 The doctor shall ensure that records are kept for each case in which EST is administered. The records should be kept in a readily accessible database which may be subject to audit for quality assurance. These records shall minimally include the following:

(a) Patient's particulars, including full name, personal identification number, date of birth and gender;
(b) Names of the supervising doctor and personnel performing the EST;
(c) Date of EST;
(d) Indications for EST;
(e) Any complication(s) during the test;
(f) Test outcome.

6.2 The doctor shall ensure that an up-to-date, dedicated register of patients who have undergone EST is available at all times.

6.3 Other records and reports (including completed consent forms) in relation to EST shall be kept with the patients’ medical records.
The records and reports shall be retained for an appropriate length of time\(^2\).

The summarised period for retention of records is as follows:

- **Computerised / electronic medical records**
  - Lifetime + 6 years, or 116 years

- **Paper Hospital / Inpatient records**
  - (includes private and community hospitals)
  - 15 years

- **Paper Ambulatory / Outpatient records**
  - (includes polyclinics, GPs, private specialists)
  - 6 years, or longer for “high-risk patients”\(^3\)

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\(^2\)In determining the appropriate retention period, the licensees may refer to the MOH Guidelines for the Retention Periods of Medical Records 2015.

\(^3\)Healthcare Institutions may identify “high-risk patients”, e.g. patients who suffered complications during treatment, pending complaint cases, patients who underwent procedures to remove foreign bodies, or patients whose mental capacity was an issue. These Medical records should be kept for a longer duration, such as 15 years which is the general overriding time limit stipulated by the Limitation Act.