



# **Canadian Society of Cardiology Technologists**

## **National Occupational Competency Profile**

**Approved by the CSCT Board of Directors October 18, 2013**

The Competency Profile lists the entry-to-practice occupational competencies that are required of the Cardiology Technologist.

These competencies establish the basis for the Certification Examination of the Canadian Society of Cardiology Technologists. They also define the required learning outcomes of accredited cardiology technology educational programs.

For convenience, the Competency Profile is divided into four broad *Competency Areas*. Within each Area there are a number of *General Competencies*, as follows:

Area 1: Cardiac Procedures

- 1.1 Record and analyze electrocardiograms.
- 1.2 Apply monitor and analyze ambulatory ECG recordings.
- 1.3 Perform exercise tolerance testing.
- 1.4 Assess pacemakers and other implantable cardiac devices.
- 1.5 *Deleted in its entirety December 2013*
- 1.6 Perform basic equipment maintenance and troubleshooting.
- 1.7 Perform Electrophysiology Testing

Area 2: Patient Care

- 2.1 Establish professional relationship with patient.
- 2.2 Obtain patient history.
- 2.3 Assess patient status.
- 2.4 Transfer patient.
- 2.5 Apply aseptic technique.
- 2.6 Provide emergency life support.
- 2.7 Perform venipuncture.
- 2.8 Apply and remove electrodes.
- 2.9 Document results of procedure.
- 2.10 Ensure follow-up care.
- 2.11 Establish a Peripheral Intravenous Line

Area 3: Professional Standards

- 3.1 Behave legally and ethically.
- 3.2 Comply with institutional directives.
- 3.3 Behave professionally.
- 3.4 Communicate effectively.
- 3.5 Perform computer skills.
- 3.6 Maintain professional relationships.
- 3.7 Provide quality service.
- 3.8 Promote occupational health and safety.
- 3.9 Maintain professional competence.

Area 4: Foundational Knowledge

- 4.1 Integrate knowledge of anatomy, physiology and pathophysiology.
- 4.2 Integrate basic knowledge of cardiac pharmacology.
- 4.3 Integrate knowledge of electrical conduction applied to cardiology.
- 4.4 Integrate knowledge of cardiac procedures.
- 4.5 Integrate knowledge of research procedures.

An Appendix identifies the cardiac pathologies of which knowledge is expected.

Within each General Competency, there are listed a number of *Competency Statements*.

The Competency Statements represent an integrated set of knowledge, skills and behaviours. Each competency informs and qualifies every other competency; competencies are not intended to be used in isolation.

The organization of the competencies within the Profile should not be construed as prescribing protocols for the practice of Cardiology Technology. The Technologist is expected to use professional judgment and to apply competencies in a manner consistent with departmental direction and the situation at hand

## Canadian Society of Cardiology Technologists Competency Profile

## Evaluation of Proficiency

For each Competency Statement, the Competency Profile identifies an *Assessment Environment (AE)*. The Assessment Environment modifies the action described in the competency statement, and indicates the setting in which proficiency in the competency is to be determined

Three distinct Assessment Environments are used, defined as follows

Assessment Environment	Definition
A (Academic)	Cognitive and affective proficiency is required, and must be determined through objective assessment of the candidate in a written and / or oral examination.
S (Simulated)	Cognitive, affective and psychomotor proficiency is required, and must be determined through objective assessment of the candidate by a qualified individual, while the candidate conducts an activity that simulates a diagnostic / therapeutic situation.
C (Clinical)	Cognitive, affective and psychomotor proficiency is required, and must be determined through objective assessment of the candidate by a qualified individual, while the candidate conducts under supervision a diagnostic / therapeutic activity with a patient.

The Assessment Environment selected for each Competency Statement is intended to ensure that educational programs assess proficiency in a manner that provides graduates with the knowledge, skills and attributes appropriate for entry-to-practice.

The Competency Statement defines the final outcome of learning, and should be regarded as a minimum terminal learning objective for an accredited program. Programs are expected to design appropriate learning activities, and to undertake a process of progressive assessment, to facilitate student learning. For example, a competency designated *Clinical* in the profile should initially be introduced at academic and (perhaps) simulated levels.

The Assessment Environments indicated in the Competency Profile represent the minimum requirements for accreditation. Where feasible, or where required for local practice settings, programs may assess in environments beyond those specified. For example, some programs may be in a position to provide *Clinical* assessment for certain competencies that are designated *Academic* or *Simulated* in the Competency Profile, and they are encouraged to do so.

The Competency Profile does not currently address the level of performance that is required to establish proficiency

Competency Statements		AE
<b>1.1 Record and analyze electrocardiograms</b>		
a.	Select electrode sites for 12-lead ECG	C
b.	Select alternate sites to accommodate patient special needs	C
c.	Select electrode sites for right-side and posterior leads	C
d.	Utilise Lewis lead, Frank x, y, and z leads	A
e.	Obtain artifact-free and technically-correct tracing	C
f.	Record ECG	C
g.	Analyze recording, and relate to patient symptoms and medications	C
h.	Determine need for additional tracings and / or rhythm strips	C
i.	Optimize instrument settings to enhance clinical data	C
j.	Compare current and previous tracings where applicable	C
k.	Instruct patient in bearing-down vagal manoeuvre	A
l.	Assist with Trendelenberg position vagal manoeuvre	A
m.	Assist with diving-reflex vagal manoeuvre	A
n.	Perform deep inspiration / expiration to identify significant Q waves	S
o.	Select electrode sites for pediatric leads	S
p.	Utilize Brugada Leads	A

Competency Statements		AE
<b>1.2 Apply Monitor and analyze ambulatory ECG recordings</b>		
a.	Select monitor parameters.	C
b.	Select electrode sites for ambulatory ECG	C
c.	Instruct patient on diary entries relative to symptoms and activities.	C
d.	Obtain trans-telephonic event monitor recordings	S
e.	Optimize instrument settings to enhance clinical data.	C
f.	Analyze recording, and relate to patient symptoms and medications	C
g.	Select relevant strips for inclusion in physician report	C
<b>1.3 Perform Exercise Tolerance testing</b>		
a.	Recognise indications and contraindications for exercise testing	S
b.	Select electrode sites for exercise tolerance testing	C
c.	Select appropriate exercise testing equipment and protocol	C
d.	Optimize instrument settings to enhance clinical data	C
e.	Monitor heart rate, ECG changes and blood pressure during rest, exercise and recovery	C
f.	Monitor physical signs and symptoms during rest, exercise and recovery	C
g.	Analyze findings, and relate to patient symptoms and medications	C
h.	Assist with interventions	C
i.	Identify criteria for test termination	C
j.	Identify life threatening conditions and take appropriate action	S
k.	Monitor rate of perceived exertion (RPE) during exercise	S

Competency Statements		AE
<b>1.4 Assess Implantable Cardiac Devices</b>		
a.	Identify indications for implant of the following cardiac devices: pacemaker, defibrillator (ICD), resynchronization therapy (CRT), implantable loop recorder	A
b.	Assess lead placement at implant, utilizing analyzer to evaluate capture, sensing and lead integrity	A
c.	Assess device function at implant; optimize initial settings	A
d.	Examine incision site and initiate action if necessary	A
e.	Identify pacing algorithms: bradycardia, tachycardia, ventricular pacing reduction and bi-ventricular	A
f.	Interrogate device	
g.	Identify indications and contraindications for use of magnet	A
h.	- <i>Item deleted Dec 2013</i>	A
i.	Analyze diagnostic data and telemetry, and relate to patient symptoms and medications	A
j.	Assess device function by establishing underlying rhythm, sensing and capture thresholds, myopotentials, crosstalk and VA conduction, Wenckebach block point, as appropriate	A
k.	Program device for optimal function, based on findings and patient needs	A
l.	Manage cardiac devices and leads that are functioning at sub-optimal levels	A
m.	Manage cardiac devices and leads that are subject to alerts, recalls or advisories	A
n.	Identify signs and symptoms of distress during procedures and take appropriate action	A
o.	Respond to urgent findings	A
p.	Identify potential environmental conditions that could interfere with cardiac device function	A
q.	Identify indications for remote patient monitoring	A

Competency Statements		AE
<i>1.5 Section deleted in entirety Dec 2013</i>		
<b>1.6 Perform basic equipment maintenance and troubleshooting</b>		
a.	Perform basic maintenance and troubleshoot electrocardiograph	C
b.	Perform basic maintenance and troubleshoot ambulatory ECG recorder /monitor	C
c.	Trouble shoot ambulatory ECG analysis systems	S
d.	Perform basic maintenance and troubleshoot treadmills and stress system recording devices	S
e.	Perform basic maintenance and troubleshoot transtelephonic recorders	S
f.	Perform basic maintenance and trouble shoot external defibrillator	S
g.	<i>- Item deleted Dec 2013</i>	
<b>1.7 Perform Electrophysiology Testing</b>		
a.	Identify the therapeutic and diagnostic indications for electrophysiology testing (EP)	A
b.	Apply knowledge of the function of the recording system, stimulator, radiofrequency generator, mapping system and catheters	A
c.	Interpret recordings to identify the mechanism of arrhythmogenesis: abnormal automaticity, reentry and triggered activity	A
d.	Measure the following intervals: AH,HV,PR,QRS,QT,SNRT (sinus node recovery time)	A
e.	Measure the following cycle lengths: AV node, Wenckebach and tachycardia	A



Competency Statements		AE
<b>2.1 Establish professional relationship with patient</b>		
a.	Introduce self to patient and family / caregivers.	C
b.	Explain procedures and respond to questions.	C
c.	Provide reassurance and support to patient.	C
d.	Treat patient with care and compassion.	C
e.	Enhance patient comfort.	C
f.	Display unconditional positive regard toward patient.	C
g.	Maintain patient confidentiality.	C
h.	Respect patient privacy.	C
i.	Maintain patient dignity.	C
j.	Show tolerance and patience when interacting with patients.	C
k.	Maintain professional boundaries in relationship with patient and family / caregivers.	C
l.	Ensure informed patient consent.	A
m.	Respond appropriately to do not resuscitate (DNR) and other patient directives.	A
<b>2.2 Obtain patient history</b>		
a.	Verify patient identification and requested procedure(s).	C
b.	Obtain cardiac history and pertinent symptoms	C
c.	Integrate history and symptoms with procedure ordered	C
d.	Obtain list of current medications	C
e.	Obtain history of cardiac surgery and procedures	C

Competency Statements		AE
<b>2.3 Assess patient status</b>		
a.	Assess patient signs and symptoms and act on situations requiring immediate response.	C
b.	Perform manual and automatic blood pressure measurement.	S
c.	Monitor blood pressure using ambulatory blood pressure monitor	S
d.	Obtain oxygen saturation level.	S
e.	Obtain patient weight and height.	C
f.	Identify heart sounds: S1, S2, S3, S4.	A
g.	Identify rales and recognize acute and chronic breathing difficulties.	A
h.	Recognize common patient mobility aids.	A
i.	Recognize common patient sensory aids.	A
j.	Recognize common patient monitoring and life-support systems	A
k.	Ensure that patient aids, monitoring and life-support systems are maintained.	S
l.	Consult physician if patient fails to meet criteria for procedure ordered.	A
m.	Identify life threatening conditions and take appropriate action.	S
n.	Identify conditions requiring physician attention.	A
<b>2.4 Transfer patient</b>		
a.	Assist in patient transfer.	S
b.	Position patient, accommodating special needs	S

Competency Statements		AE
<b>2.5 Apply aseptic technique</b>		
a.	Use standard (universal) precautions.	C
b.	Use isolation and reverse isolation techniques as applicable.	S
c.	Follow sterile field and operating room protocols.	S
d.	Decontaminate and clean equipment and self	S
<b>2.6 Provide emergency life support</b>		
a.	Maintain Basic Life Support (BLS) certification	S
b.	Locate drugs, airway management devices and suction apparatus in resuscitation cart.	C
c.	Recognize indications, contraindications and effects of drugs commonly used for the treatment of cardiac emergencies.	A
<b>2.7 Perform venipuncture</b>		
a.	Select and prepare appropriate site.	A
b.	Collect and process specimen	A
c.	Provide direction to patient	A
<b>2.8 Apply and remove electrodes</b>		
a.	Shave body hair.	C
b.	Clean and dry skin.	C
c.	Abrade skin.	C
d.	Apply electrodes.	C
e.	Attach leads and ensure integrity.	C
f.	Remove leads and electrodes; clean electrode sites.	C
g.	Assist patient with dressing if required.	C

Competency Statements		AE
<b>2.9 Document results of procedure</b>		
a.	Record patient demographics, signs and symptoms, non-standard electrode placement and patient positioning	C
b.	Prepare test results for physician's review.	C
c.	Prepare test results for cardiac information management system.	C
d.	Respond to urgent findings	A
<b>2.10 Ensure follow-up care</b>		
a.	Advise patient on follow-up to procedure.	A
b.	Advise patient on personal assessment techniques and indications for seeking assistance.	A
<b>2.11 Establish a Peripheral Intravenous (IV) Line</b>		
a.	Select and prepare appropriate site	A
b.	Establish line	A
c.	Prepare, prime and hang IV bag with tubing	S

Competency Statements		AE
<b>3.1 Behave legally and ethically</b>		
a.	Identify and comply with relevant government legislation and regulations.	A
b.	Identify and comply with relevant Code of Ethics.	A
c.	Identify and comply with relevant Scope of Practice.	A
d.	Identify and comply with relevant Standards of Practice	A
<b>3.2 Comply with institutional directives</b>		
a.	Practice within bounds of job description.	C
b.	Follow institutional and departmental directives.	C
c.	Follow established lines of communication and authority.	C
<b>3.3 Behave professionally</b>		
a.	Maintain personal hygiene and appropriate apparel.	C
b.	Prioritize activities and use time management skills.	C
c.	Accept accountability for decisions and actions.	C
d.	Practice in a manner that is non-prejudicial and that respects diverse cultural, ethnic and religious beliefs.	C

Competency Statements		AE
<b>3.4 Communicate effectively</b>		
a.	Speak clearly and concisely	C
b.	Write clearly and concisely	C
c.	Use terminology appropriate to the purpose and targeted audience	C
d.	Use and interpret general medical terminology	C
e.	Use and interpret medical terminology unique to cardiology	C
f.	Monitor effectiveness of communication and take action to enhance understanding where required	C
g.	Employ appropriate non-verbal communication	C
h.	Recognize and respond appropriately to non-verbal communication of others	C
<b>3.5 Perform computer skills</b>		
a.	Use a keyboard accurately and efficiently.	S
b.	Access data from databases, network and internet	S
c.	Perform basic troubleshooting of cardiac information management system	A
<b>3.6 Maintain professional relationships</b>		
a.	Differentiate the professional roles, functions, and responsibilities of co-workers.	A
b.	Show respect for co-workers.	C
c.	Create and sustain effective working relationships with co-workers.	C
d.	Contribute effectively to collaborative care.	C
e.	Apply conflict resolution strategies where appropriate.	A
f.	Represent the profession in a positive manner.	C
g.	Facilitate the learning of others	A

Competency Statements		AE
<b>3.7 Provide quality service</b>		
a.	Practice within the bounds of personal limitations and expertise.	C
b.	Seek advice or assistance where necessary	C
c.	Apply a logical thought process to solve problems and make professional judgment.	C
<b>3.8 Promote occupational health and safety</b>		
a.	Identify and address health and safety concerns in the working environment.	A
b.	Participate in programs designed to ensure employee health and safety.	A
<b>3.9 Maintain professional competence</b>		
a.	Maintain knowledge of emerging cardiac therapies and technologies.	A
b.	Read professional literature, evaluate information critically, and assess relevance to practice.	A
c.	Participate in continuing education activities	A
d.	Self-evaluate performance and set goals for improvement.	C
e.	Maintain relevant memberships and professional affiliations.	A
f.	Contribute to development of profession.	A

Competency Statements		AE
<b>4.1 Integrate knowledge of anatomy, physiology and pathophysiology</b>		
a.	Apply knowledge of structures and functions of all major body systems.	A
b.	Identify body systems that are affected by cardiac pathophysiologies	A
c.	Apply knowledge of the structure and function of the normal heart and circulatory system	A
d.	Apply knowledge of the electrophysiology and hemodynamics of stimulation and conduction in the normal heart	A
e.	Correlate the mechanisms of cardiac arrhythmias to cardiac pathophysiologies in Appendix 1	A
f.	Relate results of patient assessment to the cardiac pathophysiologies listed in Appendix 1	A
g.	Relate common blood test tests results to cardiac pathophysiology	A
h.	Relate the results of cardiac procedures to the pathophysiologies listed in Appendix 1	A
i.	Apply knowledge of the American Heart Association AHA indications for cardiac treatment and/or procedures	A
<b>4.2 Integrate basic knowledge of cardiac pharmacology</b>		
a.	Identify classes of cardiovascular agents, and common drugs within each class.	A
b.	Identify the physiological effects of each class of cardiovascular agent	A
c.	Relate patient signs and symptoms to medication administered	A
d.	Relate results of cardiac procedures to medication administered	A
e.	Use the <i>Compendium of Pharmaceuticals and Specialties</i> (CPS) to identify the indications and contraindications for common cardiovascular drugs	A



Competency Statements		AE
<b>4.3 Integrate knowledge of electrical conduction applied to cardiology</b>		
a.	Apply knowledge of the components and function of the following cardiac devices: cardiac pacemaker, implantable cardiac defibrillator, cardiac resynchronization device, implantable loop recorder.	A
b.	Apply knowledge of lead theory, signal averaging and vector loops	A
c.	Apply knowledge of the process of defibrillation, its purpose, and common techniques	A
<b>4.4 Integrate knowledge of cardiac procedures</b>		
a.	Apply knowledge of the following cardiac procedures and their purpose: diagnostic imaging, common cardiac surgeries, pericardiocentesis, nuclear medicine, pacemaker lead extraction, tilt table testing, esophageal lead	A
b.	Identify indications for external (trans-thoracic) pacing	A
c.	Apply knowledge of the procedure of trans-thoracic pacing, and common settings	A
d.	Identify the indications for temporary pacemaker insertion	A
e.	Apply knowledge of the procedure of temporary pacemaker insertion, and common settings	A
<b>4.5 Integrate knowledge of research procedures</b>		
a.	Identify the possible roles of the cardiology technologist in research activities.	A
b.	Identify the purpose of research activity and basic research designs	A
c.	Comply with ethical and research protocols	A
d.	Use statistical data to interpret findings	A

*The list of cardiac conditions below applies to Competency Statements 4.1.e, 4.1.f and 4.1.h.*

Acute coronary artery syndromes

Atherosclerosis/arteriosclerosis

**Cardiomyopathies:**

- dilated
- restrictive
- hypertrophic
- ARVC/ARVD – Arrhythmogenic Right Ventricular Dysplasia

**Congenital heart diseases:**

- atrial septal defects
- coarctation of the aorta
- dextrocardia
- Ebstein's anomaly
- patent ductus arteriosus
- pulmonary valvular stenosis
- tetralogy of Fallot
- transposition of the great vessels
- ventricular septal defects
- truncus arteriosus
- hypoplastic left heart syndrome
- AV canal defects
- Eisenmenger's syndrome

## Canadian Society of Cardiology Technologists Competency Profile

## Appendix 1: Cardiac Pathophysiology cont

### Genetic and inflammatory conditions:

- Long QT syndromes
- CPVT – Catecholaminergic polymorphic VT
- Brugada syndrome
- Holt-Oram syndrome
- Wellens Syndrome
- Williams syndrome
- Trisomy 13, 18, and 21
- Turner's syndrome
- Kawasaki disease
- Myocarditis
- Pericarditis
- Endocarditis

Diseases of the aorta

Diseases of the electrical conduction system

Heart failure

Hypertension

Ischemic heart disease

Pericardial diseases

Peripheral vascular disease

Valvular heart disease