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NATIONAL COMPETENCY PROFILES

GENERALIST SONOGRAPHER
CARDIAC SONOGRAPHER
VASCULAR SONOGRAPHER

Version 5.1
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FOR AUTHORIZED USE ONLY

Approved by the Board of Directors

(NCPs)

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The Profession

Diagnostic medical sonographers are health care professionals who perform ultrasound examinations of the human body. Sonographers acquire images in a variety of formats and provide a technical impression of findings to the reporting physician, usually a radiologist but in some instances an obstetrician, cardiologist, or vascular surgeon.

Sonographers are integral members of the health care team and interact extensively with other health care professionals in order to provide information that is essential to diagnosis and patient care.

The Canadian standard of practice for sonographers was established by Sonography Canada (formerly the Canadian society of diagnostic Medical Sonographers (CSDMS) & Canadian-Association of Registered Diagnostic Ultrasound Professionals (CARDUP) in 2003. Sonography Canada certifies three categories of entry-level sonographer: the Generalist Sonographer, the Cardiac Sonographer and the Vascular Sonographer.

Generalist Sonographers are qualified to perform ultrasound examinations of the abdomen, superficial structures, obstetrics, gynecological and lower extremity peripheral veins examinations. Cardiac Sonographers are qualified to perform anatomical and functional assessments of the heart and associated vessels. Vascular Sonographers are qualified to perform sonographic examinations on all vascular structures in the human body to assess the anatomy and physiology.

Diagnostic medical sonographers are employed in various health care facilities. Hospitals employ all categories of sonographer; Generalist Sonographers often work in general diagnostic imaging departments; Cardiac and Vascular Sonographers may work in the cardiology or vascular units of tertiary care facilities. Clinics provide a variety of employment opportunities based on their patient care focus. Sonographers may also become educators, application specialists or sales representatives with medical equipment companies, or be involved in research.

Purpose of the National Competency Profile

The National Competency Profile (NCP) lists the competencies that are expected at entry-to-practice of the three certification categories. Its primary purpose is to set standards for education and certification.

The NCP has been accepted by Accreditation Canada for use in the accreditation of sonography education programs. As well as meeting other requirements, accredited programs must develop curriculum and learning activities which ensure that their graduates possess all the competencies listed in the relevant section of the NCP. The NCP establishes a *minimum* educational standard; programs are free to include additional competencies to meet local and regional needs, at their discretion.

In order to provide sonographer certification, Sonography Canada assesses the competencies of applicants for registration utilizing both clinical and knowledge-based assessment vehicles. The blueprints for these assessment vehicles are derived from the NCP.

Since it provides information about the job tasks that sonographers may be expected to perform, the NCP will also be of use to many other stakeholders in the profession: employers, physicians, practicing sonographers, students, government agencies and the general public.

Conceptual Framework and Definitions

Competence refers to the ability of a professional to function safely, effectively and ethically. The competence of sonographers – and the competence of other health care professionals - is crucial to patient well-being. However, it is well established that competence is *developmental* (it evolves over the span of a person's career), *impermanent* (knowledge and skills that are not regularly utilized are lost) and *context-specific* (competence is not measurable in the absence of a specific practice situation).

Competence is enabled by the possession of *competencies*. We define a competency as *a job task that can be performed with a specified level of proficiency*.

At entry-to-practice, sonographers are expected to be able to perform a specific range of job tasks with *entry-level proficiency*[1].

Entry-level proficiency recognizes that at entry-to-practice sonographers are beginners in the profession, whose proficiency will, in general, increase over time. Nevertheless, entry-level sonographers are expected to perform routinely-occurring tasks safely, effectively and ethically.

We define entry-level proficiency as follows:

- *When presented with routine situations, the entry-level sonographer performs relevant competencies in a manner consistent with generally accepted standards in the profession, independently, and within a reasonable timeframe. The entry-level sonographer anticipates what outcomes to expect in a given situation, and responds appropriately, selecting and performing competencies in an informed manner.*

- *The entry-level sonographer recognizes unusual, difficult to resolve and complex situations which may be beyond her / his capacity. The entry-level sonographer takes appropriate and ethical steps to address these situations, which may include consulting with others, seeking supervision or mentorship, reviewing literature or documentation, or referring the situation to a more experienced sonographer.*

[1] Following entry-to-practice, the range job tasks that a sonographer actually performs will vary with their practice setting.

Structure of the NCP

The competencies within the NCP are integrated, and include a common core of competencies possessed by all three sonographer categories. Category-specific competencies build upon the core:

Generalist Sonographer Competencies	Cardiac Sonographer Competencies	Vascular Sonographer Competencies
Common Core of Competencies		

The competencies are grouped into competency areas as follows:

Area 1 Communication
Area 2 Professional Responsibilities
Area 3 Patient Assessment and Care
Area 4 Operation of Equipment
Area 5 Critical Thinking and Problem Solving
Area 6 Workplace Health and Safety
Area 7 Imaging

Specific imaging techniques applicable to Area 7 are listed in a series of Appendices numbered 1.1 through 1.8

Within each Area, competencies are listed in a table and clustered together under headings for convenience and ease of reference. However, it must be emphasized that the listing of competencies should not be considered as a protocol. The competencies are better viewed as an array of abilities that the entry-level sonographer brings to the workplace and applies to the situation at hand utilizing professional judgement, and consistent with organizational direction.

To the right of each competency statement are columns identifying the competency as either core or applicable to a specific sonographer category; indication is provided by reference to the designated Assessment Environment (see below).

Utilization of the NCP in Sonography Education Programs

Education programs are expected to develop curricula which ensure that prior to program completion students demonstrate entry-level proficiency in the competencies included in the relevant component of the NCP.

The NCP designates an *Assessment Environment*[2] for each competency, which identifies the educational setting in which students must be assessed for proficiency.

The following Assessment Environments are used:

Assessment Environment	**Definition**	**Criterion for Student Success**
Academic, A	Academic education takes place in a classroom or through guided study involving cognitive and / or affective learning.	Academic assessment consistent with the definition of entry-level proficiency.
Simulation, S	Simulation involves cognitive, affective and / or psychomotor learning in a setting that simulates a practice activity.	Simulated performance consistent with the definition of entry-level proficiency.
Clinical, C	Clinical education involves cognitive, affective and / or psychomotor learning where learners work directly with human patients in a setting designed to provide patient care. Learners are supervised throughout their clinical education, in a manner that facilitates their development of independent clinical abilities while ensuring safe, effective and ethical patient care.	Reliable clinical performance consistent with the definition of entry-level proficiency.

The designated Assessment Environment applies to the final assessment of the student's proficiency. Where simulation is designated, a program should provide academic education and academic assessment prior to simulation. Where a clinical setting is designated, a program should provide academic education, academic assessment and, where appropriate, simulation education and assessment prior to clinical exposure.

[2] Assessment Environments were referred to as Performance Environments in previous versions of the NCP.

The Assessment Environment designated in the NCP is the minimum requirement. Programs may at their discretion assess proficiency in a more complex environment[3].

To assess proficiency, programs are expected to utilize experienced educators and / or clinicians who have been oriented to the NCP and provided with sufficient direction to ensure consistent, reliable decisions about student performance. Student performance is to be judged in the context of the definition of entry-level proficiency provided above[4].

Development and validation of the NCP

The profiles were originally developed by expert committees of practitioners and educators, and validated through national surveys of practicing sonographers and employers. Development and validation took place over a period of approximately three years, with funding support from Human Resources Development Canada. The NCP was first published in April 2003. Minor revisions based upon user feedback took place in 2004 and 2006.

A complete review and re-validation was undertaken over the period March - October 2007, involving a thorough consultation with stakeholders. This resulted in the publication of version 4.0 in 2008.

The most recent review and stakeholder revalidation took place in 2012-13, led by a Consultant and a specifically-constituted Revalidation Committee.

This NCP was subsequently reissued in January 2018 to revise appendix 1.6. Extracranial artery competencies were changed from clinical ('C') to simulation ('S') based on national feedback from employers and educational programs.

[3] We consider the relative complexity of assessment environments to be academic < simulation < clinical.
[4] In former versions of the NCP a quantitative definition of proficiency was utilized, involving an "80% performance" rule; this has been discontinued in recognition of the fact that competence is context-specific. For similar reasons, the concept of "critical competencies" (which must be demonstrated 100% of the time) has been dropped.

The process involved:

- Preliminary consultation on strategic issues with the Sonography Canada Boards and committees, and CMA Conjoint Accreditation Services
- Development of an updated conceptual framework, definitions and proposed structural changes
- Identification of proposed new competencies, wording changes for clarity, and assessment environment adjustments based upon the knowledge and experience of Revalidation Committee members
- Consultation with practitioners on the frequency of use of selected competencies
- Consultation with employers on evolving service needs and the competency requirements for entry-level sonographers
- Consultation with sonography education programs on the conceptual framework, definitions, structural changes and the feasibility of incorporating proposed new competencies and assessment environment adjustments
- Preparation of an updated NCP (Version 5.0) in response to feedback received, and approval of the document by the Board of Directors of Sonography Canada (formerly Canadian society of Diagnostic Medical Sonographers (CSDMS) & Canadian Association of Registered Diagnostic Ultrasound Professionals (CARDUP).
- Consultation with Sonography Canada National Education Advisory Committee on the implementation schedule for the updated profile

Acknowledgements

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AREA 1: COMMUNICATION

Competencies		Core	Generalist	Cardiac	Vascular
1.1 Oral communication					
	Identify self to patient.	C			
b	Adapt communication in response to patient and situation.	C			
c	Adapt communication for patients with special needs.	S			
d	Communicate with patient throughout examination, in manner appropriate to patient's ability to understand.	C			
e	Explain examination procedure to patient.	C			
f	Question patient to obtain relevant information regarding history and condition.	C			
g	Communicate departmental reporting procedures to patient.	C			
h	Respond to patient questions or concerns.	C			
i	Communicate with patient's relatives and / or support persons.	C			
j	Communicate effectively with-other health care professionals.	C			
k	Use medical terminology and standard abbreviations in oral communication.	C			
l	Apply conflict resolution strategies.	A			
1.2 Written communication					
a	Verify written, authorized directions for examination.	C			
b	Record accurate and relevant medical history.	C			
c	Record examination procedures and results.	C			
d	Ensure that documentation is timely, accurate, concise and complete.	C			
e	Write medical terminology and standard abbreviations.	C			
1.3 Non-verbal communication					
a	Use appropriate body language.	C			
b	Respond appropriately to non-verbal behaviours.	C			

AREA 2: PROFESSIONAL RESPONSIBILITIES

Competencies		Core	Generalist	Cardiac	Vascular
2.1 Written directives					
a	Adhere to relevant legislation and regulations.	A			
b	Adhere to professional scope of practice and code of ethics.	A			
c	Adhere to organizational policies and procedures.	C			
2.2 Professional judgement					
a	Verify that requested procedure correlates with patient's clinical history and presentation, and address concerns as appropriate.	C			
b	Evaluate patient preparation for requested examination.	C			
c	Practice within limits of personal knowledge and skills.	A			
d	Ask for guidance where appropriate.	C			
e	Evaluate for contraindications to procedure and address as appropriate.	C			
f	Record exceptions from established protocols and procedures.	C			
g	Identify and respond to urgent sonographic findings.	C			
h	Make decisions based on evidence, clinical information, resource implications and other contextual factors.	C			
i	Take responsibility for decisions and actions.	C			

AREA 2: PROFESSIONAL RESPONSIBILITIES

Competencies		Core	Generalist	Cardiac	Vascular
2.3 Professional conduct					
a	Maintain professional appearance and manner.	C			
b	Display respect toward others irrespective of diversity.	C			
c	Recognize the roles of health care professionals commonly encountered in the workplace.	A			
d	Contribute productively to teamwork and collaborative practice.	S			
e	Share knowledge with patients, colleagues, students and other members of health care team.	C			
f	Provide and receive feedback in a professional manner.	C			
g	Manage time and workload efficiently.	C			
h	Demonstrate reliability, flexibility and adaptability.	C			
i	Participate in patient education.	C			
j	Recognize need for presence of a chaperone.	A			
k	Recognize, respond to and disclose adverse events.	A			
l	Demonstrate awareness of professional liability.	A			
m	Maintain awareness of current and emerging issues in health care relevant to the practice of sonography.	A			
n	Maintain awareness of current and emerging technological developments in the field of sonography.	A			
2.4 Maintenance of competence					
a	Critically appraise performance and set goals for self improvement.	C			
b	Review professional literature and assess relevance to practice.	A			
c	Demonstrate awareness of need for continuing professional development.	A			
2.5 Medico-legal responsibilities					
a	Maintain patient confidentiality.	C			
b	Ensure informed patient consent.	C			

AREA 3: PATIENT ASSESSMENT AND CARE

Competencies		Core	Generalist	Cardiac	Vascular
3.1 Patient safety and comfort					
a	Verify patient identification.	C			
b	Transport and / or move patient.	S			
c	Assess patient's ability to tolerate examination.	C			
d	Employ sterile technique and infection control methods.	C			
e	Assess and monitor patient's physical and mental status prior to and during examination, and respond.	C			
f	Create an environment that protects patient modesty.	C			
g	Determine need for additional personnel to assist in examination.	C			
h	Perform examination in a timely manner.	C			
i	Maintain awareness of patient's accessory equipment and take action as required.	A			
j	Recognize and respond to emergency situations.	A			
k	Provide support in emergency situations.	S			
l	Perform cardiopulmonary resuscitation.	S			
3.2 Assistance with clinical procedures					
a	Assist in interventional procedures.	A			
b	Assist in contrast-enhanced procedures.	A			
c	Assist in transesophageal echocardiography.			A	

AREA 3: PATIENT ASSESSMENT AND CARE

Competencies		Core	Generalist	Cardiac	Vascular
3.3 Related techniques and procedures					
a	Measure blood pressure.	S			
b	Perform palpation of pulses.	S			
c	Perform palpation of areas of interest.		C		C
d	Perform provocative maneuvers.	C			
e	Perform stress echocardiography.			A	
f	Set up 3-lead electrocardiogram (ECG).			C	
g	Assess for signs and symptoms of vascular disease.				C
h	Perform photoplethysmography.				C
i	Perform arterial pressure testing and calculate indices.				C
j	Perform vascular exercise testing.				A
k	Perform continuous wave Doppler velocimetry in peripheral vessels.				C

AREA 4: OPERATION OF EQUIPMENT

	Competencies	Core	Generalist	Cardiac	Vascular
4.1 Equipment set-up					
a	Select optimum system and transducer for examination considering patient's age and size, structures being examined and specific indications for examination.	C			
b	Determine and select correct pre-set values.	C			
c	Record pertinent patient data using keyboard or other input device.	C			
4.2 Use of equipment					
a	Perform sonographic examinations using real-time 2-D scanning.	C			
b	Perform sonographic examinations using M-mode.		C	C	
c	Perform sonographic examinations using pulsed wave Doppler.	C			
d	Perform sonographic examinations using colour Doppler.	C			
e	Perform sonographic examinations using power Doppler.		C		C
f	Perform sonographic examinations using continuous wave Doppler.			C	C
g	Perform sonographic examinations using tissue Doppler.			C	
h	Orient and manipulate transducer.	C			
i	Select optimal acoustic window.	C			
j	Use and optimize harmonic imaging.	C			
k	Perform sonographic examinations using 3-D imaging.		A	A	
l	Monitor output display indices and adjust power output in accordance with "as low as reasonably achievable" (ALARA) principle.	C			

AREA 4: OPERATION OF EQUIPMENT

	Competencies	Core	Generalist	Cardiac	Vascular
m	Identify artifacts and adjust instrument controls to optimize image.	C			
n	Measure structures.	C			
o	Measure M-mode tracings.		C	C	
p	Measure Doppler waveforms.	C			
q	Perform calculations manually.	A			
r	Use software calculation packages.	C			
s	Record patient position and plane of section on images.		C		
t	Process and record patient data.	C			
u	Archive and retrieve patient data.	C			
4.3 Equipment maintenance					
a	Perform instrument quality control using test objects / phantoms.	A			
b	Identify degraded instrument performance.	A			
c	Perform basic trouble shooting prior to calling for technical support.	A			

AREA 5: CRITICAL THINKING AND PROBLEM SOLVING

Competencies		Core	Generalist	Cardiac	Vascular
5.1 Examination planning					
a	Interpret history, signs & symptoms and other relevant information.	C			
b	Assess medical history and health status.	C			
c	Modify scope of examination based on clinical history.	C			
d	Formulate sonographic scanning strategies.	C			
e	Integrate knowledge of anatomy and disease processes.	C			
5.2 Integration of relevant, available diagnostic data					
a	Correlate results from laboratory tests.	A			
b	Correlate results from aspirations and biopsies.	A			
c	Correlate results from radiography.	A			
d	Correlate results from angiography.	A			
e	Correlate results from computerized tomography.	A			
f	Correlate results from nuclear medicine studies.	A			
g	Correlate results from magnetic resonance studies.	A			
h	Correlate results from amniocentesis.		A		
i	Correlate results from chorionic villus sampling.		A		
j	Correlate results from chromosome analysis.		A		
k	Correlate results from dilatation and curettage.		A		
l	Correlate results from non-stress testing.		A		
m	Correlate results from ECG studies.			A	
n	Correlate results from Holter monitoring.			A	
o	Correlate results from stress ECG studies.			A	
p	Correlate results from oximetry tests.			A	A
q	Correlate results from auscultation.			A	A

AREA 5: CRITICAL THINKING AND PROBLEM SOLVING

Competencies		Core	Generalist	Cardiac	Vascular
5.3 Image quality					
a	Adjust patient positioning to advantage.	C			
b	Use breathing techniques to advantage .	C			
c	Evaluate images for orientation, identification, and labeling.	C			
d	Evaluate images for quality.	C			
e	Modify scope of examination based on sonographic findings.	C			
f	Evaluate completeness of examination.	C			
g	Recognize equipment limitations.	C			
h	Recognize technical limitations.	C			
5.4 Technical analysis					
a	Differentiate artifact from anatomic and pathologic findings.	C			
b	Differentiate normal variants from pathology.	C			
c	Use spatial reasoning to interpret images.	C			
d	Identify and prioritize differential findings.	C			
e	Formulate impression based on findings.	C			
f	Provide oral summary of impression to reporting physician.	C			
g	Provide written summary of impression to reporting physician.	C			

AREA 6: WORKPLACE HEALTH AND SAFETY

Competencies		Core	Generalist	Cardiac	Vascular
6.1 Safety of the work environment					
a	Maintain clean and orderly work area.	C			
b	Recognize hazardous conditions in the work area, and respond.	C			
c	Maintain awareness of fire and disaster plans.	A			
d	Locate emergency equipment.	C			
e	Employ universal precautions for infection control.	C			
6.2 Self protection					
a	Employ proper body mechanics when transferring, lifting, turning or transporting patient.	C			
b	Practice musculoskeletal injury prevention techniques.	C			
c	Follow Workplace Hazardous Materials Information System (WHMIS) protocols.	A			

AREA 7: IMAGING

Competencies		Core	Generalist	Cardiac	Vascular
7.1 Generalist sonography - obstetrical					
a	Perform sonographic examination of structures of interest using techniques listed in Appendix 1.1		See App 1.1		
b	Recognize sonographic appearance of normal structures.		C		
c	Differentiate sonographic appearance of normal structures from anomolous and pathologic conditions.		C		
d	Produce diagnostic data documenting sonographic findings.		C		
7.2 Generalist sonography - gynecological					
a	Perform sonographic examination of structures of interest using techniques listed in Appendix 1.2		See App 1.2		
b	Recognize sonographic appearance of normal structures.		C		
c	Differentiate sonographic appearance of normal structures from anomolous and pathologic conditions.		C		
d	Produce diagnostic data documenting sonographic findings.		C		
7.3 Generalist sonography - abdominal					
a	Perform sonographic examination of structures of interest using techniques listed in Appendix 1.3		See App 1.3		
b	Recognize sonographic appearance of normal structures.		C		
c	Differentiate sonographic appearance of normal structures from anomolous and pathologic conditions.		C		
d	Produce diagnostic data documenting sonographic findings.		C		

AREA 7: IMAGING

Competencies		Core	Generalist	Cardiac	Vascular
7.4 Generalist sonography - superficial structures					
a	Perform sonographic examination of structures of interest using techniques listed in Appendix 1.4		See App 1.4		
b	Recognize sonographic appearance of normal structures.		C		
c	Differentiate sonographic appearance of normal structures from anomolous and pathologic conditions.		C		
d	Produce diagnostic data documenting sonographic findings.		C		
7.5 Generalist sonography - musculoskeletal					
a	Demonstrate knowledge of sonographic examination of structures of interest using techniques listed in Appendix 1.5		See App 1.5		
b	Recognize sonographic appearance of normal structures.		A		
c	Differentiate sonographic appearance of normal structures from anomolous and pathologic conditions.		A		
7.6 Generalist sonography - extracranial arteries and peripheral veins					
a	Perform sonographic examination of structures of interest using techniques listed in Appendix 1.6		See App 1.6		
b	Recognize sonographic appearance of normal structures.		C		
c	Differentiate sonographic appearance of normal structures from anomolous and pathologic conditions.		C		
d	Produce diagnostic data documenting sonographic findings.		C		

AREA 7: IMAGING

Competencies		Core	Generalist	Cardiac	Vascular
7.7 Cardiac sonography					
a	Perform sonographic examination of structures of interest using techniques listed in Appendix 1.7			See App 1.7	
b	Recognize sonographic appearance of normal structures.			C	
c	Differentiate sonographic appearance of normal structures from anomolous and pathologic conditions.			C	
d	Produce diagnostic data documenting sonographic findings.			C	
7.8 Vascular sonography					
a	Perform sonographic examination of structures of interest using techniques listed in Appendix 1.8				See App 1.8
b	Recognize sonographic appearance of normal structures.				C
c	Differentiate sonographic appearance of normal structures from anomolous and pathologic conditions.				C
d	Produce diagnostic data documenting sonographic findings.				C

APPENDIX 1.1: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER-OBSTETRICS

The table below applies to Specific Competency 7.1.a, and lists the techniques the practitioner should be able to utilize when examining the structures and characteristics noted.

	TECHNIQUE						
STRUCTURE / CHARACTERISTIC	**real time assessment (transvesical)**	**measure (2D)**	**endovaginal**	**transperineal**	**Doppler assessment**	**measure (Doppler)**	**M-mode**
Maternal Pelvis							
Cervix	C	C	C	A			
Fallopian tubes	C		C				
Gestational sac	C	C	C				
Ligaments	C		C				
Membranes	C		C				
Ovaries	C	C	C				
Relational anatomy	C		C				
Uterine vessels	C		C		A		
Uterus	C	C	C				
Vagina	C						
Yolk sac	C	C	C				

APPENDIX 1.1: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER-OBSTETRICS

STRUCTURE / CHARACTERISTIC	TECHNIQUE						
	real time assessment (transvesical)	measure (2D)	endovaginal	transperineal	Doppler assessment	measure (Doppler)	M-mode
Determination of fetal age							
Abdominal circumference (AC)	C	C					
Biparietal diameter (BPD)	C	C	A				
Embryo: crown rump length	C	C	C				
Estimated fetal weight (EFW)	C	C					
Femur length (FL)	C	C					
Gestational sac size	C	C	C				
Head circumference (HC)	C	C					
Humerus length (HL)	C	A					
Fetal Head							
Anterior ventricles (AV)	C	A					
Cavum septum pellucidum	C						
Cerebellum	C	C					
Cerebral vessels	A				A		
Choriod plexus	C						
Cisterna magna (CM)	C	C					
Falx cerebri	C						

APPENDIX 1.1: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER-OBSTETRICS

STRUCTURE / CHARACTERISTIC	TECHNIQUE						
	real time assessment (transvesical)	measure (2D)	endovaginal	transperineal	Doppler assessment	measure (Doppler)	M-mode
Posterior ventricles (PV)	C	C					
Skull	C						
Thalamus	C						
Third ventricle	C						
Spine							
Cervical spine	C						
Lumbo-sacral spine	C						
Thoracic spine	C						
Fetal Face							
Facial profile	C						
Mouth / lips	C						
Nasal bones	C	A					
Orbits	C	A					
Fetal Neck							
Nuchal fold	C	C					
Nuchal translucency	C	A					

APPENDIX 1.1: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER-OBSTETRICS

STRUCTURE / CHARACTERISTIC	TECHNIQUE						
	real time assessment (transvesical)	measure (2D)	endovaginal	transperineal	Doppler assessment	measure (Doppler)	M-mode
Fetal Chest / Thorax							
Diaphragm	C						
Lungs	C						
Thoracic shape	C						
Fetal Heart							
4 Chamber fetal heart	C						
Aortic arch	C						
Heart rate	C		C				C
Long axis	C						
Outflow tracts	C						
Short axis	C						
Fetal Abdomen							
Adrenals	C						
Aorta	C						
Bowel	C						
Gallbladder	C						
Kidneys	C	C					

APPENDIX 1.1: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER-OBSTETRICS

STRUCTURE / CHARACTERISTIC	TECHNIQUE						
	real time assessment (transvesical)	measure (2D)	endovaginal	transperineal	Doppler assessment	measure (Doppler)	M-mode
Liver	C						
Renal pelvis	C	C					
Spleen	C						
Stomach	C						
Umbilical cord	C				A	A	
Fetal Pelvis							
Bladder	C						
Genitalia	C						
Fetal Skin							
Contour	C						
Thickness	C	A					
Fetal Musculoskeleton							
Feet	C						
Femurs	C	C					
Fibula	C	A					
Hands	C						
Humerus	C	A					
Radius	C	A					

APPENDIX 1.1: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER-OBSTETRICS

STRUCTURE / CHARACTERISTIC	TECHNIQUE						
	real time assessment (transvesical)	measure (2D)	endovaginal	transperineal	Doppler assessment	measure (Doppler)	M-mode
Ribs	C						
Tibia	C	A					
Ulna	C	A					
Determination of:							
Aminiotic fluid pocket depth	C	C					
Amniotic fluid index (AFI)	C	C					
Chorio-amnionicity	C		A				
Cord insertion	C						
Fetal lie	C						
Fetal presentation	C						
Number of fetuses	C		A				
Placenta grading	C						
Placental location	C		A	A			
Placental thickness	C	A					
Biophysical Profile							
Amniotic fluid	C	C					
Breathing	C						
Fetal movement	C						
Fetal tone	C						

APPENDIX 1.2: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER - GYNECOLOGY

The table below applies to Specific Competency 7.2.a, and lists the techniques the practitioner should be able to utilize when examining the structures and characteristics noted.

STRUCTURE / CHARACTERISTIC	TECHNIQUE				
	real time assessment (transvesical)	measure (2D)	endovaginal	Doppler assessment	sonohysterography
Adnexa	C		C		
Cervix	C		C		
Cul-de-sacs	C		C		
Endometrium	C	C	C		A
Fallopian tubes	C		C		A
Muscles & ligaments of the female pelvis	A		A		
Ovaries	C	C	C	C	
Relational anatomy	C		C		
Urinary bladder	C				
Uterus	C	C	C	A	A
Vagina	C				
Vasculature of the female pelvis	C		C	A	

APPENDIX 1.3: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER - ABDOMEN

The table below applies to Specific Competency 7.3.a, and lists the techniques the practitioner should be able to utilize when examining the structures and characteristics noted.

STRUCTURE / CHARACTERISTIC	TECHNIQUE				
	real time assessment	measure (2D)	Doppler assessment	measure (Doppler)	transrectal
Abdominal aorta	C	C	A		
Abdominal wall	C				
Adrenal glands	A				
Biliary System	C	C			
Celiac trunk	C				
Chest and thorax	A				
Common iliac arteries	C	C	A		
Common iliac veins	A		A		
Gastrointestinal tract	A				
Inferior vena cava	C		A		
Kidneys, ureters	C	C			
Liver - lobes, segments	C				
Liver- capsule, parenchyma	C				

APPENDIX 1.3: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER - ABDOMEN

Liver - vasculature	C		S		
Pancreas	C	A			
Peritoneal, retroperitoneal cavities / spaces	C				
Renal arteries and veins	S				
Spleen - capsule, parenchyma	C	C			
Spleen - vasculature	S		A		
Superior mesenteric artery	C				
Urinary bladder	C	A			
Male pelvis - prostate, seminal vesicles	C	C			A

APPENDIX 1.4: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER- SUPERFICIAL STRUCTURES

The table below applies to Specific Competency 7.4.a, and lists the techniques the practitioner should be able to utilize when examining the structures and characteristics noted.

STRUCTURE / CHARACTERISTIC	TECHNIQUE		
	real time assessment	measure (2D)	Doppler assessment
Breast	S		
Groin	A		
Parathyroid / neck	A		
Salivary glands	A		
Scrotum	C	C	C
Superficial tissues	A		
Thyroid	C	C	C

APPENDIX 1.5: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER - MUSCULOSKELETAL

The table below applies to Specific Competency 7.5.a, and lists the techniques the practitioner should be able to utilize when examining the structures and characteristics noted.

STRUCTURE / CHARACTERISTIC	TECHNIQUE real time assessment
Elbow	A
Foot and ankle	A
Hand and wrist	A
Knee	A
Shoulder	A

APPENDIX 1.6: EXAMINATION TECHNIQUES FOR THE GENERALIST SONOGRAPHER- EXTRACRANIAL ARTERIES AND PERIPHERAL VEINS

The table below applies to Specific Competency 7.6.a, and lists the techniques the Generalist Sonographer should be able to utilize when examining the structures and characteristics noted.

STRUCTURE / CHARACTERISTIC	TECHNIQUES				
	real time assessment	measure (2D)	pulsed wave Doppler assessmen	measure - pulse wave Doppler	colour Doppler assessment
Extracranial arteries					
Common carotid artery	S		S	S	S
Internal carotid artery	S		S	S	S
External carotid artery	S		S	S	S
Vertebral artery	S		S	S	S
Subclavian artery	S		S	S	S
Peripheral veins, upper extremity, for DVT					
Jugular vein	S		S		S
Innominate vein	S		S		S
Subclavian vein	S		S		S
Axillary vein	S		S		S
Brachial vein	S		A		S
Basilic vein	S		A		S
Cephalic vein	S		A		S
Peripheral veins, lower extremity, for DVT					
Common femoral vein	C		C		C
Femoral vein	C		C		C
Popliteal vein	C		C		C

APPENDIX 1.7: EXAMINATION TECHNIQUES FOR THE CARDIAC SONOGRAPHER

The table below applies to Specific Competency 7.7.a, and lists the techniques the Cardiac Sonographer should be able to utilize when examining the structures and characteristics noted.

STRUCTURE / CHARACTERISTIC	TECHNIQUE											
	2-D real time assessment	measure (2D)	M-mode assessment	measure - M-mode	pulsed wave Doppler assessment	measure - pulsed wave Doppler	continuous wave Doppler assessment	measure - continuous wave Doppler	colour Doppler assessment	measure - colour Doppler	tissue Doppler assessment	measure - tissue Doppler
Aorta, arch & branches	C	C			C	A	C	C	C			
Aorta, ascending	C	C			C	A	C	C	C			
Aorta, descending	C	C			C	C	C	C	C			
Aorta, root	C	C	C	C	C	C	C	C	C			
Appendages	A											
Atrium, left	C	C	C	C					C			
Atrium, right	C	C							C			
Cardiac position	C											
Chest & thorax (adjacent, extra-cardiac)	C											
Coronary vessels	A	A							A			
Hepatic veins	C				C	A			C			
Outflow tracts	C	C			C	C	C	C	C			

APPENDIX 1.7: EXAMINATION TECHNIQUES FOR THE CARDIAC SONOGRAPHER

STRUCTURE / CHARACTERISTIC	TECHNIQUE											
	2-D real time assessment	measure (2D)	M-mode assessment	measure - M-mode	pulsed wave Doppler assessment	measure - pulsed wave Doppler	continuous wave Doppler assessment	measure - continuous wave Doppler	colour Doppler assessment	measure - colour Doppler	tissue Doppler assessment	measure - tissue Doppler
Pulmonary artery	C	S			C	C	C	C	C			
Pulmonary artery, bifurcation	C				A	A	A	A	C			
Pulmonary veins	C				C	C			C			
Septum, inter-atrial	C				C	C	C	C	C			
Septum, inter-ventricular	C	C	C	C	C	C	C	C	C			
Normal situs	C											
Valve, aortic	C		C	C	C	C	C	C	C	C		
Valve, mitral	C	S	C	A	C	C	C	C	C	C		
Valve, pulmonic	C				C	C	C	C	C	A		
Valve, tricuspid	C				C	C	C	C	C	C		
Valve, tricuspid (annulus)	C		C	C								
Vena cava, inferior	C	C	C	C	C		C		C			
Vena cava, superior	A								A			
Ventricle, left	C	C	C	C					C		C	C
Ventricle, right	C	C	C	C					C		C	C
Wall layers (endo, myo, pericardium)	C	C	C	C								
Wall segments	C	C	C									
Wall segments (strain)	A										A	A

APPENDIX 1.8: EXAMINATION TECHNIQUES FOR THE VASCULAR SONOGRAPHER

The table below applies to Specific Competency 7.8.a, and lists the techniques the Vascular Sonographer should be able to utilize when examining the structures and characteristics noted.

STRUCTURE / CHARACTERISTIC	TECHNIQUES					
	real time assessment	measure (2D)	pulsed wave Doppler assessment	measure - pulsed wave Doppler	colour Doppler assessment	Continuous Wave Doppler Assessmen
Abdominal vascular						
Aorta	C	C	C	C	C	
Celiac trunk	C	A	S	S	S	
Hepatic artery	C	C	C	C	C	
Superior mesenteric artery	C	A	S	S	S	
Inferior mesenteric artery	S	A	A	A	A	
Renal artery	C	A	S	S	S	
Hepatic veins	C	C	C	C	C	
Portal veins	C	C	C	C	C	
Inferior vena cava	C	S	S	S	S	
Extracranial arteries						
Common carotid artery	C	A	C	C	C	
Internal carotid artery	C	A	C	C	C	
External carotid artery	C	A	C	C	C	
Vertebral artery	C	A	C	C	C	
Intracranial arteries	A	A	A	A	A	

APPENDIX 1.8: EXAMINATION TECHNIQUES FOR THE VASCULAR SONOGRAPHER

STRUCTURE / CHARACTERISTIC	TECHNIQUES					
	real time assessment	measure (2D)	pulsed wave Doppler assessment	measure - pulsed wave Doppler	colour Doppler assessment	Continuous Wave Doppler Assessmen
Peripheral arteries, upper extremity						
Innominate artery	S	S	S	S	S	
Subclavian artery	C	C	C	C	C	
Axillary artery	S	S	S	S	S	S
Brachial artery	S	S	S	S	S	S
Forearm arteries	S	S	S	S	S	S
Peripheral arteries, lower extremity						
Iliac arteries	C	C	C	C	C	
Common femoral artery	C	C	C	C	C	C
Femoral artery	C	C	C	C	C	C
Popliteal artery	C	C	C	C	C	C
Calf arteries	C		S	S	S	C
Peripheral veins, upper extremity						
Jugular vein	S		S		S	
Innominate vein	S		S		S	
Subclavian vein	S		S		S	
Axillary vein	S		S		S	
Brachial vein	S	A	S		S	
Forearm veins	A	A	A		A	
Basilic vein	S	A	S		S	
Cephalic vein	S	A	S		S	

APPENDIX 1.8: EXAMINATION TECHNIQUES FOR THE VASCULAR SONOGRAPHER

STRUCTURE / CHARACTERISTIC	TECHNIQUES					
	real time assessment	measure (2D)	pulsed wave Doppler assessment	measure - pulsed wave Doppler	colour Doppler assessment	Continuous Wave Doppler Assessmen
Peripheral veins, lower extremity						
Iliac veins	C		C		C	
Common femoral vein	C		C		C	
Femoral vein	C		C		C	
Popliteal vein	C		C		C	
Calf veins	S		S		S	
Saphenous veins	C	A	C		C	
Grafts and stents						
Aortic bypass and endografts	A	A	A	A	A	
Iliac grafts and stents	A	A	A	A	A	
Lower extremity bypass grafts and stents	A	A	A	A	A	
Hemodialysis grafts and fistulas	A	A	A	A	A	
Transjugular intrahepatic portosystemic shunts (TIPS)	A	A	A	A	A	