



The SonoSim Ultrasound Training Solution in Accordance with The Canadian Medical Student Ultrasound Curriculum

The Canadian Ultrasound Consensus for Undergraduate Medical Education Group has released [The Canadian Medical Student Ultrasound Curriculum](#). The goal of this statement is to “establish by expert review a consensus-based, focused ultrasound curriculum, consisting of a foundational set of focused ultrasound skills that all Canadian medical students would be expected to attain at the end of the medical school program.”¹ The award-winning, patented SonoSim Ultrasound Training Solution matches these industry recommendations through an ecosystem of cloud-based courses, knowledge assessments, interactive SonoSimulator® scanning cases, performance tracking, and access to real-patient pathology.

Consensus Canadian Medical Student Ultrasound Curriculum

Ultrasound Concepts		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Ultrasound physics (e.g., frequency, wavelengths)	Fundamentals of Ultrasound: Basic Ultrasound Physics, Doppler-Mode Imaging	All SonoSim Cases
Sound interactions with tissue (e.g., reflection, scatter, refraction)	Fundamentals of Ultrasound: Basic Ultrasound Physics, Imaging Artifacts	
Common artifacts (e.g., reverberations, attenuation, shadowing, post-acoustic enhancement)		
Basic knobology (e.g., depth, gain)	Fundamentals of Ultrasound: Ultrasound System Operation	
Primary control (e.g., freeze, save images/cine loops)	--	
B-mode imaging	Fundamentals of Ultrasound: Imaging Artifacts, Imaging Modes	
M-mode imaging	Fundamentals of Ultrasound: Imaging Modes	Lungs Anatomy & Physiology Cases eFAST Cases Advanced Second- & Third-Trimester Pregnancy: Part II Cases FoCUS - Part I & II Cases Pericardiocentesis Cases Thoracentesis Cases SonoSim LiveScan® Cardiac Resuscitation, Critical Care, & Trauma Care Cases
Transducer characteristics	Fundamentals of Ultrasound: Basic Ultrasound Physics	All SonoSim Cases
Transducer orientation	Fundamentals of Ultrasound: Imaging Conventions	
Scan plane terminology (e.g., coronal, sagittal, axial)		
Transducer movements (e.g. sliding, heel-toeing, rocking)	All SonoSim Courses	
Basic ultrasound terminology (e.g., anechoic, hyperechoic, complex, heterogeneous)	Fundamentals of Ultrasound: Basic Ultrasound Physics	
ALARA (as low as reasonably achievable) principle	Fundamentals of Ultrasound: Infection Control & Biosafety	--
Potential bioeffects (e.g. thermal, mechanical)		

¹ Ma IWY, Steinmetz P, Weerdenburg K, et al. The Canadian Medical Student Ultrasound Curriculum: A Statement From the Canadian Ultrasound Consensus for Undergraduate Medical Education Group. *J Ultrasound Med.* 2020 Jul;39(7):1279-1287. doi: 10.1002/jum.15218. Epub 2020 Jan 13.

Patient Interactions		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Obtain consent	Fundamentals of Ultrasound: Imaging Conventions	--
Appropriate hand hygiene and infection control practices	Fundamentals of Ultrasound: Infection Control & Biosafety	
Appropriate patient interaction	Fundamentals of Ultrasound: Imaging Conventions, Infection Control & Biosafety	
Appropriate patient draping	--	All SonoSim Cases
Appropriate management of incidental findings	All SonoSim Courses	
Recognize scope, limitations, and when to ask for help		

Anatomy and Physical Examination		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Thyroid	<i>Thyroid Anatomy & Physiology: All Lessons</i>	<i>Thyroid & Upper Airway Anatomy & Physiology Cases</i>
Internal jugular vein	<i>Cerebrovascular Anatomy & Physiology: All Lessons</i>	<i>Cerebrovascular Anatomy & Physiology Cases</i>
Carotid artery		<i>Internal Jugular Vein Cannulation Cases</i>
Trachea/thyroid cartilage	<i>Thyroid Anatomy & Physiology: All Lessons</i> <i>Upper Airway Anatomy & Physiology: All Lessons</i>	<i>Thyroid & Upper Airway Anatomy & Physiology Cases</i> <i>Airway Core Clinical Cases</i>
Ribs	<i>Heart Anatomy & Physiology: General Considerations</i> <i>Lungs Anatomy & Physiology: Sonographic Anatomy</i>	<i>Heart & Lungs Anatomy & Physiology Cases</i> <i>Airway Core Clinical Cases</i> <i>Cardiology Core Clinical Cases</i> <i>eFAST Cases</i>
Pleura	<i>Lungs Anatomy & Physiology: Anatomy, Sonographic Anatomy</i>	<i>Lungs Anatomy & Physiology Cases</i> <i>Airway Core Clinical Cases</i> <i>Pulmonary Core Clinical Cases</i> <i>Advanced Pediatric Lung Sonography Cases</i> <i>Pediatric Challenge Cases</i> <i>Pulmonary Challenge Cases</i>
Diaphragm	<i>Lungs Anatomy & Physiology: Anatomy, Sonographic Technique</i> <i>Pulmonary Core Clinical: Sonographic Technique, Case Studies Pleural Effusion, Case Studies Lung Consolidation</i>	<i>Lungs Anatomy & Physiology Cases</i> <i>eFAST & FAST Cases</i> <i>Pulmonary Core Clinical Cases</i> <i>RUSH Cases</i> <i>Advanced Pediatric Lung Sonography Cases</i>
Right ventricle	<i>Heart Anatomy & Physiology: All Lessons</i> <i>Cardiology Core Clinical: All Lessons</i> <i>FoCUS - Part I: Imaging Windows</i>	<i>Heart Anatomy & Physiology Cases</i> <i>Cardiology Core Clinical Cases</i> <i>RUSH Cases</i> <i>FoCUS - Part I & II Cases</i>
Left ventricle		
Left atrium		
Right atrium	<i>Heart Anatomy & Physiology: All Lessons</i> <i>Cardiology Core Clinical: All Lessons</i> <i>FoCUS - Part I: Imaging Windows</i> <i>FoCUS - Part II: Anatomy & Physiology</i>	
Cardiac valves (e.g. aortic, mitral, tricuspid)		

Anatomy and Physical Examination (Cont.)		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Interventricular/interatrial septum	<i>Heart Anatomy & Physiology: All Lessons</i> <i>Cardiology Core Clinical: All Lessons</i> <i>FoCUS - Part I: Imaging Windows, Case Studies I</i>	<i>Heart Anatomy & Physiology Cases</i> <i>Cardiology Core Clinical Cases</i> <i>RUSH Cases</i> <i>FoCUS - Part I & II Cases</i>
Cardiac apex	<i>Heart Anatomy & Physiology: All Lessons</i> <i>Cardiology Core Clinical: All Lessons</i>	
Pericardium		
Liver	<i>Liver Anatomy & Physiology: All Lessons</i>	<i>Liver Anatomy & Physiology Cases</i> <i>eFAST & FAST Cases</i> <i>RUSH Cases</i> <i>Abdomen Challenge Cases</i> <i>SonoSim LiveScan® Genitourinary & Hepatobiliary Cases</i>
Spleen	<i>Spleen Anatomy & Physiology: All Lessons</i>	<i>Spleen Anatomy & Physiology Cases</i> <i>eFAST & FAST Cases</i> <i>RUSH Cases</i> <i>Abdomen Challenge Cases</i> <i>Genitourinary Challenge Cases</i> <i>SonoSim LiveScan® Genitourinary & Hepatobiliary Cases</i>
Kidneys	<i>Renal Anatomy & Physiology: All Lessons</i> <i>Renal Core Clinical: Anatomy, Sonographic Anatomy, Sonographic Technique</i>	<i>Renal Anatomy & Physiology Cases</i> <i>eFAST & FAST Cases</i> <i>Renal Core Clinical Cases</i> <i>RUSH Cases</i> <i>Abdomen Challenge Cases</i> <i>Genitourinary Challenge Cases</i> <i>SonoSim LiveScan® Genitourinary & Hepatobiliary Cases</i>
Aorta	<i>Aorta/IVC Anatomy & Physiology: All Lessons</i> <i>Aorta/IVC Core Clinical: Anatomy, Imaging Technique</i>	<i>Aorta/IVC Anatomy & Physiology Cases</i> <i>Aorta/IVC Core Clinical Cases</i>
Inferior vena cava		
Spine	<i>Spine Anatomy & Physiology: All Lessons</i>	<i>Spine Anatomy & Physiology Cases</i>
Gallbladder	<i>Biliary Tree Anatomy & Physiology: All Lessons</i> <i>Intestinal/Biliary Core Clinical: All Lessons</i>	<i>Biliary Tree Anatomy & Physiology Cases</i> <i>Intestinal/Biliary Core Clinical Cases</i> <i>eFAST & FAST Cases</i> <i>RUSH Cases</i> <i>Abdomen Challenge Cases</i> <i>Genitourinary Challenge Cases</i> <i>SonoSim LiveScan® Hepatobiliary Cases</i>
Urinary bladder	<i>Bladder Anatomy & Physiology: All Lessons</i> <i>Renal Anatomy & Physiology: Anatomy, Sonographic Anatomy, Sonographic Technique</i> <i>Bladder Core Clinical: All Lessons</i>	<i>Bladder, Prostate, & Renal Anatomy & Physiology Cases</i> <i>Bladder Core Clinical Cases</i> <i>eFAST & FAST Cases</i> <i>OB/GYN Core Clinical Cases</i> <i>Renal Core Clinical Cases</i> <i>RUSH Cases</i> <i>All Advanced GYN Cases</i> <i>Genitourinary Challenge Cases</i> <i>SonoSim LiveScan® Genitourinary Cases</i>
Uterus	<i>Female Pelvis Anatomy & Physiology: All Lessons</i> <i>OB/GYN Core Clinical: All Lessons</i> <i>All Advanced GYN Courses: All Lessons</i>	<i>Female Pelvis Anatomy & Physiology Cases</i> <i>OB/GYN Core Clinical Cases</i> <i>All Advanced GYN Cases</i> <i>GYN Challenge Cases</i> <i>OB Challenge Cases</i>

Anatomy and Physical Examination (Cont.)		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Proximal inguinal regional vessels (e.g. femoral artery/vein/great saphenous)	<i>Leg-Arterial Anatomy & Physiology: All Lessons</i> <i>Leg-Venous Anatomy & Physiology: All Lessons</i> <i>DVT - Lower Extremity Core Clinical: Normal Anatomy & Physiology, Sonographic Anatomy, Sonographic Technique</i>	<i>Hip, Leg-Arterial, & Leg-Venous Anatomy & Physiology Cases</i> <i>DVT - Lower Extremity Core Clinical Cases</i> <i>RUSH Cases</i>

Physiology		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Cardiac cycle	<i>Heart Anatomy & Physiology: Heart Physiology</i> <i>FoCUS - Part I: Cardiac Output Measurements</i>	<i>Heart Anatomy & Physiology Cases</i> <i>Cardiology Core Clinical Cases</i> <i>RUSH Cases</i>
Systole/diastole	<i>Heart Anatomy & Physiology: All Lessons</i> <i>FoCUS - Part I: Cardiac Output Measurements</i> <i>FoCUS - Part II: Anatomy & Physiology</i>	<i>FoCUS - Part I & II Cases</i> <i>SonoSim LiveScan® Cardiac Resuscitation & Critical Care Cases</i>

Clinical Applications		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Recognition of appropriate indications for point-of-care ultrasound use	<i>All SonoSim Courses</i>	<i>All SonoSim Cases</i>
Appropriate application of evidence regarding indications/image acquisition/image interpretation issues into specific patient contexts		
Sources of false-positive and false-negative results	<i>SonoSim Core & Advanced Clinical Courses</i>	<i>SonoSim Core & Advanced Clinical Cases</i>
Implications of presence of false-positive and false-negative results on clinical decision making		
Pleural effusion	<i>Pulmonary Core Clinical: Case Studies Pleural Effusion</i> <i>Advanced Pediatric Lung Sonography: Case Studies</i> <i>Thoracentesis: All Lessons</i>	<i>Airway Core Clinical Cases</i> <i>Aorta/IVC Core Clinical Cases</i> <i>Cardiology Core Clinical Cases</i> <i>eFAST Cases</i> <i>Pulmonary Core Clinical Cases</i> <i>FoCUS - Part I & II Cases</i> <i>Advanced Pediatric Lung Sonography Cases</i> <i>Pericardiocentesis Cases</i> <i>Thoracentesis Cases</i> <i>Pediatric Challenge Cases</i> <i>SonoSim LiveScan® Cardiac Resuscitation & Trauma Care Cases</i>
Consolidation	<i>Pulmonary Core Clinical: Case Studies Lung Consolidation</i> <i>Advanced Pediatric Lung Sonography: Sonographic Anatomy, Case Studies</i>	<i>Pulmonary Core Clinical Cases</i> <i>RUSH Cases</i> <i>Advanced Pediatric Lung Sonography Cases</i> <i>Thoracentesis Cases</i> <i>Pediatric Challenge Cases</i> <i>SonoSim LiveScan® Critical Care & Late Stage Pregnancy Cases</i>

Clinical Applications (Cont.)		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Pneumothorax	<i>Pulmonary Core Clinical: Case Studies Lung Evaluation, Case Studies Pneumothorax Rule-Out, Case Studies Pneumothorax Rule-In</i> <i>Advanced Pediatric Lung Sonography: Sonographic Anatomy, Case Studies</i>	<i>eFAST Cases</i> <i>Pulmonary Core Clinical Cases</i> <i>RUSH Cases</i> <i>Advanced Pediatric Lung Sonography Cases</i> <i>SonoSim LiveScan® Cardiac Resuscitation, Critical Care, & Trauma Care Cases</i>
Normal lung (A lines)	<i>Lungs Anatomy & Physiology: Sonographic Anatomy</i> <i>Pulmonary Core Clinical: Sonographic Anatomy</i>	<i>Lungs Anatomy & Physiology Cases</i> <i>Airway Core Clinical Cases</i> <i>RUSH Cases</i> <i>Advanced Pediatric Lung Sonography Cases</i> <i>Pediatric Challenge Cases</i> <i>Pulmonary Challenge Cases</i> <i>SonoSim LiveScan® Critical Care Cases</i>
B lines/interstitial syndrome	<i>Lungs Anatomy & Physiology: Sonographic Anatomy</i> <i>Fundamentals of Ultrasound: Imaging Artifacts</i> <i>Pulmonary Core Clinical: Sonographic Anatomy, Case Studies Alveolar Interstitial Syndrome</i> <i>Advanced Pediatric Lung Sonography: Sonographic Anatomy, Case Studies</i>	<i>Lungs Anatomy & Physiology Cases</i> <i>Airway Core Clinical Cases</i> <i>eFAST Cases</i> <i>Pulmonary Core Clinical Cases</i> <i>RUSH Cases</i> <i>Advanced Pediatric Lung Sonography Cases</i> <i>Thoracentesis Cases</i> <i>Pediatric Challenge Cases</i> <i>Pulmonary Challenge Cases</i> <i>SonoSim LiveScan® Cardiac Resuscitation, Critical Care, & Trauma Care Cases</i>
Recognition of cystic vs solid/noncystic structures	<i>Bladder Core Clinical: Case Pathologies</i> <i>OB/GYN Core Clinical: Case Studies</i> <i>Renal Core Clinical: Case Studies</i> <i>Advanced First-Trimester Pregnancy: Pathologic Conditions</i> <i>Advanced GYN Malignant Adnexal Conditions: Sonographic Characterization of Adnexal Masses, Borderline Tumors</i> <i>Advanced GYN Nonmalignant Adnexal Conditions: Ovarian Cysts</i> <i>Advanced GYN Normal Adnexa: Sonographic Anatomy</i>	<i>Bladder Core Clinical Cases</i> <i>DVT - Lower Extremity Core Clinical Cases</i> <i>Intestinal/Biliary Core Clinical Cases</i> <i>OB/GYN Core Clinical Cases</i> <i>Renal Core Clinical Cases</i> <i>RUSH Cases</i> <i>Soft Tissue Core Clinical Cases</i> <i>Advanced First-Trimester Pregnancy Cases</i> <i>Advanced GYN Malignant Adnexal Conditions Cases</i> <i>Advanced GYN Nonmalignant Adnexal Conditions Cases</i> <i>Advanced GYN Normal Adnexa Cases</i> <i>Advanced GYN Normal Uterus Cases</i> <i>Advanced Neonatal & Infant Neurosonography Cases</i> <i>GYN Challenge Cases</i> <i>SonoSim LiveScan® Critical Care, Early Stage Pregnancy, Genitourinary, Late Stage Pregnancy, & Neonatal & Infant Neurosonography Cases</i>
Parasternal long-axis view	<i>Heart Anatomy & Physiology: All Lessons</i> <i>Cardiology Core Clinical: All Lessons</i>	<i>Heart Anatomy & Physiology Cases</i>
Parasternal short-axis view		<i>Cardiology Core Clinical Cases</i>
Apical 4-chamber view		<i>eFAST & FAST Cases</i>
Subcostal 4-chamber view		<i>FoCUS - Part I & II Cases</i> <i>Pericardiocentesis Cases</i> <i>SonoSim LiveScan® Cardiac Resuscitation, Critical Care, & Trauma Care Cases</i>

Clinical Applications (Cont.)		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Gross left ventricular function	<i>Cardiology Core Clinical:</i> Parasternal Long-Axis View, Parasternal Short-Axis View, Mid-Ventricle, Apical Four-Chamber View, Subcostal Four-Chamber View, IVC Evaluation & RAP, Case Studies <i>FoCUS - Part I:</i> Case Studies I, Case Studies II <i>FoCUS - Part II:</i> Echocardiographic Techniques	<i>Cardiology Core Clinical Cases</i> <i>FoCUS - Part I & II Cases</i> <i>Resuscitative TEE Cases</i> <i>SonoSim LiveScan® Cardiac Resuscitation & Critical Care Cases</i>
Pericardial effusion	<i>Cardiology Core Clinical:</i> Subcostal Window, Case Studies <i>eFAST:</i> Sonographic Anatomy & Technique, Case Studies <i>RUSH:</i> Sonographic Anatomy, Sonographic Technique, Case Studies <i>Pericardiocentesis:</i> All Lessons	<i>Cardiology Core Clinical Cases</i> <i>eFAST Cases</i> <i>RUSH Cases</i> <i>FoCUS - Part I & II Cases</i> <i>Pericardiocentesis Cases</i> <i>SonoSim LiveScan® Cardiac Resuscitation, Critical Care, & Trauma Care Cases</i>
Free fluid: right upper quadrant	<i>eFAST & FAST:</i> Sonographic Anatomy & Technique, Case Studies	<i>eFAST & FAST Cases</i> <i>RUSH Cases</i> <i>Paracentesis Cases</i> <i>Abdomen Challenge Cases</i> <i>SonoSim LiveScan® Critical Care, Genitourinary, Hepatobiliary, & Trauma Care Cases</i>
Free fluid: left upper quadrant		<i>eFAST & FAST Cases</i> <i>RUSH Cases</i> <i>Paracentesis Cases</i> <i>SonoSim LiveScan® Critical Care & Trauma Care Cases</i>
Free fluid: pelvic views	<i>eFAST & FAST:</i> Sonographic Anatomy & Technique, Cases Studies <i>Advanced First-Trimester Pregnancy:</i> Pathologic Conditions <i>Advanced GYN Normal Adnexal Conditions:</i> Sonographic Anatomy & Technique, Female Pelvis Physiology <i>Advanced GYN Normal Uterus:</i> Female Pelvis Physiology, Case Studies	<i>Bladder Core Clinical Cases</i> <i>eFAST & FAST Cases</i> <i>OB/GYN Core Clinical Cases</i> <i>RUSH Cases</i> <i>Abdomen Challenge Cases</i> <i>Advanced GYN Malignant Adnexal Conditions Cases</i> <i>SonoSim LiveScan® Critical Care, Genitourinary, & Trauma Care Cases</i>
Hydronephrosis	<i>Renal Core Clinical:</i> Obstructive Uropathy, Case Studies	<i>Intestinal/Biliary Core Clinical Cases</i> <i>Renal Core Clinical Cases</i> <i>Genitourinary Challenge Cases</i> <i>SonoSim LiveScan® Early Stage Pregnancy, Genitourinary, & Late Stage Pregnancy Cases</i>
Abdominal aortic aneurysm	<i>Aorta/IVC Core Clinical:</i> Introduction, Clinical Considerations, Case Studies	<i>Aorta/IVC Core Clinical Cases</i>
Inferior vena cava	<i>Aorta/IVC Core Clinical:</i> IVC Evaluation & CVP <i>Cardiology Core Clinical:</i> IVC Window, Case Studies <i>RUSH:</i> Anatomy, Sonographic Anatomy, Sonographic Technique <i>FoCUS - Part I:</i> Pulmonary Artery Pressure Measurements, Case Studies II <i>FoCUS - Part II:</i> Valvular Regurgitation	<i>Aorta/IVC Anatomy & Physiology Cases</i> <i>Aorta/IVC Core Clinical Cases</i> <i>Cardiology Core Clinical Cases</i> <i>eFAST Cases</i> <i>RUSH Cases</i> <i>FoCUS - Part I & II Cases</i> <i>Pericardiocentesis Cases</i> <i>SonoSim LiveScan® Cardiac Resuscitation, Critical Care, Hepatobiliary, & Trauma Care Cases</i>
Jugular venous height	--	<i>Cerebrovascular Anatomy & Physiology Cases</i> <i>Internal Jugular Vein Cannulation Cases</i>

Procedures		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Ultrasound-guided peripheral intravenous insertion	<i>Peripheral Venous Access: All Lessons</i>	<i>Peripheral Venous Access Cases</i>
General needle guidance technique using ultrasound	<i>All Ultrasound-Guided Procedure Courses</i>	<i>All Ultrasound-Guided Procedure Cases</i>

Recommended Format(s) of Training		
Curricular Element	SonoSim Course & Lesson	Relevant SonoSimulator Cases
Use of didactic lectures	All SonoSim Courses --	--
Use of online videos/podcasts		
Use of simulation		All SonoSim Cases
Use of small-group scanning on standardized patients		All SonoSim LiveScan® Cases
Use of small-group scanning on patients		
Allow learners to scan themselves, supervised		
Allow learners to scan each other, supervised		

Concepts Not Covered
 Patient Interactions: Appropriate communication of findings including uncertainties
 Physiology: Heart sound generation
 Recommended Format(s) of Training: Use of interprofessional training, Time spent with point-of-care ultrasound providers, Use of student interest groups, Use of peer teachers