Cardiovascular Computed Tomography Job/Task Analysis Executive Summary – 2016/2017

Prepared for CBCCT/ ACPA™ by

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Contents

THE JOB TASK ANALYSIS METHODOLOGY

A diverse panel of experienced cardiovascular computed tomography (CCT) imaging specialists was formed into a Job Task Analysis (JTA) Working Group. This group was charged with the primary responsibility of defining a draft list of the tasks performed by professionals in the field and the knowledge, skills and abilities believed to be important for competent performance of those tasks in order to survey practitioners in the field on the state of the practice of cardiovascular CT.

The JTA Working Group met face-to-face on December 2 and 3, 2016 in Rockville, MD. The meeting was facilitated by Clarence "Buck" Chaffee, President of The Caviart Group, with the assistance of Inteleos staff Dawn Edgerton and Helen Gootinag.

During this meeting, the group discussed and came to consensus on the characteristics of a newly certified cardiovascular computed tomography imaging specialist.

The description of the characteristics of such individuals created by the JTA Working Group is as follows:

Definition of a Certified Cardiovascular Computed Tomography Imaging Specialist

Certified cardiovascular computed tomography (CT) imaging specialists are physicians who are trained in Cardiovascular CT, have the ability to determine the appropriateness of a Cardiovascular CT study, properly select patients, and safely perform and accurately interpret Cardiovascular CT studies. They are able to understand the diagnostic and prognostic implications of the test results and effectively communicate the findings.

They understand the strengths and limitations of different acquisition protocols and their impact on the interpretation of Cardiovascular CT studies. They are able to effectively integrate the clinical and other pertinent data into a single comprehensive and clinically relevant report.

They supervise the activities of technologists/medical personnel according to institutional protocols.

They are able to understand the fundamental radiation safety concepts and implementation principles as they apply to cardiovascular CT.

SURVEY ADMINISTRATION

On September 15, 2017 the CBCCT JTA survey was launched. CBCCT used an internet survey software system to deliver the final survey. Any computer with a web browser and a web connection could be used to access the survey.

Individuals were recruited to respond through direct email invitations. A total of 3,668 emails were sent to CBCCT Diplomates and SCCT Physician members. 185 emails were returned as undeliverable. We are not able to determine the number of emails that were actually delivered and opened. Two follow-up emails were sent to everyone who had not started the survey as well as those who had started the survey but had not completed the survey. The survey was closed on October 8, 2017.

A total of 597 responses were received during the survey period. Of these responses, 430 were deemed to be sufficiently complete and from individuals whose demographic information represented them as qualified CCT professionals.

Since we are unable to determine how many surveys were actually delivered, we are unable to calculate a response rate for this study. The 430 usable survey responses however exceeds the minimum required for statistically reliable results for the study. In addition, the distribution of the demographic characteristics of the respondent population is believed to be representative of the breadth of the profession[1].

[1] Per CBCCT JTA Working Group

Converting Raw Data to Criticality Score

Response Scales		Overall Criticality Score	Notes
Importance	**Frequency**		
Critically Important (5)	Frequently (5)	16	These tasks are either frequently performed, very important, or both. As a result, most of these tasks should be kept. A rationale is required for any of these tasks that are removed. **Items should be reviewed if "Importance" is below 3.**
	Often (4)	15	
	Occasionally (3)	14	
	Rarely (2)	13	
Very Important (4)	Frequently (5)	12	
	Often (4)	11	
	Occasionally (3)	10	
	Rarely (2)	9	
Important (3)	Frequently (5)	8	These tasks may be kept or removed. A rationale is required for any of these tasks that are removed.
	Often (4)	7	
	Occasionally (3)	6	
	Rarely (2)	5	
Somewhat Important (2)	Frequently (5)	4	These tasks are either infrequently/never performed, of little importance, or both. As a result, most of these tasks should be considered for removal. A rationale is required for any of these tasks that are kept.
	Often (4)	3	
	Occasionally (3)	2	
	Rarely (2)	1	
Not Important (1)	All options	0	
All options	Never (1)	0	

FINAL TEST SPECIFICATION (CONFIDENTIAL)

The following test specification was unanimously approved by the CBCCT Job Task Analysis by email vote concluded on December 8, 2017.

This report was approved by the APCA Council on March 2, 2018. This content outline will be applied to the 2019 administration of the CBCCT examination.

ID	Domain	Task	Weight	KSA's
I	**Perform Pre-Exam Tasks**		**14%**	
I	A	Review prior focused medical history and clinical information		Knowledge of test relative and absolute contraindications Knowledge of proper breath holding techniques
I	B	Evaluate clinical indications considering appropriate use criteria		Knowledge of medications used in cardiovascular CT (such as beta blockers, calcium blockers, nitrates and ivabradine)
I	C	Educate referring physician and other health care providers		Knowledge of informed consent
I	D	Perform or direct pre-test counseling for patient		Knowledge of diagnostic capabilities and limitations of the test
I	E	Screen for contraindications		Knowledge of cardiovascular tests and alternative options
I	F	Perform or direct pre-test patient preparation and test instructions		Knowledge of cardiovascular medicine as it pertains to cardiovascular CT, including calcium scoring Knowledge of appropriate use criteria and relevant guidelines Skill in communicating with patients, other physicians and other healthcare providers Ability to integrate information and modify the planned procedure as required Ability to identify critical information that might affect test indication, appropriateness, safety and performance

II	**Perform In-Suite Exam Functions**		**16%**	
II	**A**	Supervise patient (pre-test, intra-scan, post-test) treatment optimization		Knowledge of cardiovascular CT physics Knowledge of contrast resolution and signal-to-noise ratios Knowledge of contrast administration and contrast agents Knowledge of how pacemakers affect cardiac CT scanning Knowledge of pacemaker optimization options Knowledge of proper ECG gating techniques and trouble-shooting Knowledge of radiation dose reduction strategies Knowledge of scanner capabilities and limitations Knowledge of scanning protocol options Knowledge of signs, symptoms and management of adverse contrast reactions Knowledge of venous access and injection options, issues and complications Ability to articulate instructions to technologists Ability to assess scan artifacts and determine remedy Ability to identify poor quality scans and make adjustments in scanning reconstruction Ability to identify significance of and manage heart rate and arrhythmias Ability to recognize and manage cardiovascular or other clinical distress
II	**B**	Manage heart rate and recognize arrhythmias		
II	**C**	Adjust pacemaker settings as applicable for optimal scanning		
II	**D**	Select scanning protocol and troubleshoot scanning acquisition problems		
II	**E**	Perform scan quality assessment		
II	**F**	Practice radiation safety principles		

III	**Interpret Studies**		**55%**	
III	**A**	Check for scan artifacts		Knowledge of standard nomenclature for coronary segments and dominance
III	**B**	Assess coronary anatomy		Knowledge of various artifacts, their sources and their potential remedies (including artifacts related to bright structures, image processing artifacts and motion artifacts)
III	**C**	Quantify coronary artery stenosis		Ability to adjust scan parameters for cardiac vein scanning
III	**D**	Assess coronary stents		Ability to apply proper acquisition modes (including LVADs)
III	**E**	Assess coronary artery bypass grafts		Ability to apply protocols pertinent to cardiac chambers
III	**F**	Assess chronic total occlusions		Ability to apply protocols pertinent to cardiac function and assessment
III	**G**	Perform plaque characterizations (e.g., identify high risk plaque)		Ability to apply protocols pertinent to valvular evaluation
III	**H**	Assess coronary anomalies		Ability to assess pulmonary number, size, location and anomalies
III	**I**	Assess pulmonary veins		Ability to correctly recognize and categorize coronary stenoses, location, severity, significance and risk
III	**J**	Assess cardiac veins		Ability to differentiate high risk from low risk coronary anomalies
III	**K**	Assess cardiac chambers		Ability to identify non diagnostic scans or segments
III	**L**	Assess cardiac function		Ability to interpret calcium score (including Agatston score, plaque volume, plaque mass, percentile)
III	**M**	Assess pericardium		Ability to measure size and categorize pericardial thickness
III	**N**	Assess native/artificial valves		Ability to measure size and function of cardiac chambers
III	**O**	Assess myocardium		Ability to recognize and classify segmental and global cardiac function and pathology
III	**P**	Assess appendage		Ability to recognize aortic pathology
III	**Q**	Assess septum (atrial/ventricular)		Ability to recognize appendage pathology
III	**R**	Assess percutaneous valvuloplasty procedures (e.g., feasibility of, TAVR, etc.)		Ability to recognize cardiac chamber pathologies
III	**S**	Assess congenital heart disease		Ability to recognize cardiac devices (including variety and impact on interpretation)
III	**T**	Assess aorta		
III	**U**	Assess pulmonary artery		

III	**V**	Assess vascular anomalies
III	**W**	Assess common lung disease, pulmonary nodules/tumors and pleural effusions
III	**X**	Assess mediastinal and hilar pathology
III	**Y**	Assess other non-vascular structures (e.g., bones, soft tissue)
III	**Z**	Assess calcium scoring

Ability to recognize cardiac vein pathology

Ability to recognize congenital heart disease

Ability to recognize coronary anomalies

Ability to recognize high risk plaque features (such as high plaque volume, positive remodeling, spotty calcification, napkin ring sign, low attenuation plaque)

Ability to recognize indications for cardiac vein assessment

Ability to recognize indications for pulmonary vein assessment

Ability to recognize mediastinal and hilar pathology

Ability to recognize myocardium pathology (e.g., infarction, perfusion, aneurysm, masses, viability)

Ability to recognize non coronary calcium (such as MAC)

Ability to recognize pathology related to device (e.g, pacer, ICD, hemodaynamic support, etc.)

Ability to recognize pathology of other non-vascular structures (such as bones, other soft tissue, etc.)

Ability to recognize pleural effusions

Ability to recognize pulmonary nodules/tumors

Ability to recognize pulmonary vein pathology

Ability to recognize septum pathology

Ability to recognize the differences in scanning and interpreting bypasses of different types and locations

Ability to recognize the differences in scanning and interpreting stents of different sizes and types

Ability to recognize the differences in scanning parameters for known chronic total occlusions

Ability to recognize the limitations of distinguishing subtotal and total occlusions

Ability to recognize the pertinent anatomic considerations when interpreting known chronic total occlusions

			Ability to recognize therapeutic and prognostic implications of coronary pathology Ability to recognize vascular pathology
IV	**Perform Post-Scan Tasks and Reporting Findings**	**15%**	
	A Supervise reconstruction protocols **B** Actively perform post-processing (i.e., manipulation and reformatting at workstation) **C** Evaluate and treat adverse contrast reactions and extravasations **D** Evaluate and manage contrast-induced nephropathy		Knowledge of the storage parameters for raw and reconstructed data Knowledge of reformatting types, including strengths and limitations Knowledge of DICOM and PACS storage capabilities and limitations Knowledge of image quality resolutions (such as contrast, temporal, spatial and field-of-view) Ability to reconstruct raw data Ability to utilize full capacity of workstation tools Ability to reconstruction and post-processing options and indications for use Ability to actively reformat multi planar images to improve image quality and diagnostic accuracy
	TOTAL	**100%**	