Digital Imaging and Communications in Medicine (DICOM)

Supplement 249: Ultrasound Fetal Anatomy Survey Structured Report Extensions

DICOM Standards Committee

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Scope and Field

This supplement to the DICOM Standard introduces new SR template content to address fetal anatomy survey assessments in ultrasound reports. Specifically, a sub-template is added to TID 5000 along with corresponding CIDs to address the anatomy of interest and assessments for each.

Clinical guidelines from the International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) call for a survey of fetal anatomy in the first, second, and third trimesters to identify structural anomalies. In Japan, JSUM guidelines call for first and second trimester anatomical surveys. The guidelines identify specific lists of anatomy to consider.

- https://www.isuog.org/static/f465db45-655c-42eb-96a196bcd2d34547/ISUOG-Practice-Guidelines-Updated-performance-of-11-14-week-ultrasound-scan.pdf
- https://www.isuog.org/static/4e2ed89e-fa8a-42c2-9c0929cd89cb58ff/ISUOG-Practice-Guidelines-routine-mid-trimester-fetal-ultrasound.pdf
- https://www.isuog.org/static/47b32c42-6727-4888-b4fe349005111180/Ultrasound-in-Obstet-Gyne-2024-Khalil-ISUOG-Practice-Guidelines-performance-of-thirdtrimester-obstetric.pdf
- https://journals.sagepub.com/doi/epub/10.1177/8756479314532221

WG6Qs:

Should we create anatomy group CIDs (Head, Spine, etc) to mirror the groupings in the example reports and/or reflect such groupings in the resulting structure to influence display?

The guidelines provide details on what characteristics and thresholds to consider for different pieces of anatomy when determining if they are normal or abnormal. Presume we don't need to encode that here?

Are we OK with "four chamber view" being an "anatomic feature" location under heart to be assessed as normal/abnormal?)

Some assessments go into more detail, eg for Placenta Location (marginal, partial, complete previa, low lying, etc) or Cardiac Size (mild/mod/severe increased/decreased) or Cardiac function (mild/mod/severe impairment of contractility), Fetal Position, Cervix description,

Sonographic appearance of fetal anatomy Normal = N Abnormal = A Not visualized = NV		N	A	NV
Head and brain				
	Intact cranium / normal shape			
	Midline falx			
	Choroid plexus / lateral ventricles			
	IT / brainstem / cisterna magna			
	Cerebral peduncles with AoS			
Face and neck				
	Nuchal translucency			
	Retronasal triangle			
	Maxilla / mandible			
	Orbits			
Thorax				
	Thorax shape with lung fields Diaphragmatic continuity			
Heart				
	Heart intrathoracic with regular rhythm			
	Cardiac size and axis			
	Four-chamber view			
	Left ventricular outflow tract			
	Right ventricular outflow tract			
	Three-vessel-and-trachea view			
Abdomen				
	Stomach filled			
	Bladder filled (length < 7 mm)			
	Intact abdominal wall			
	Two umbilical arteries			
	Kidneys			
Spine				
Limbs				
	Upper limbs with three segments			
	Lower limbs with three segments			

Changes to NEMA Standards Publication PS3.6

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Part 6: Data Dictionary

Add the following UID Values to Part 6 Annex A Table A-3:

TABLE A-3 CONTEXT GROUP UID VALUES

Context UID	Context Identifier	Context Group Name
…	…	…
1.2.840.10008.6.1.newcidUID1	**newcid1**	**Fetal Anatomy Survey Item**

Changes to NEMA Standards Publication PS3.16

Part 16: Content Mapping Resource

Modify PS3.16 TID 5000 as shown

TID 5000 OB-GYN Ultrasound Procedure Report

This is the Template for the root of the Content Tree for the OB-GYN ultrasound procedure report.

Type: **Extensible**
Order: **Significant**
Root: **Yes**

Table TID 5000. OB-GYN Ultrasound Procedure Report

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	BCID 12024 “OB-GYN Ultrasound Report Document Title”	1	M		Root node
…								
7	>	CONTAINS	INCLUDE	DTID 5002 “OB-GYN Procedure Summary Section”	1	U		
8	>	CONTAINS	INCLUDE	DTID 5004 “Fetal Biometry Ratio Section”	1-n	U		
9	>	CONTAINS	INCLUDE	DTID 5005 “Fetal Biometry Section”	1-n	U		
10	>	CONTAINS	INCLUDE	DTID 5006 “Fetal Long Bones Section”	1-n	U		
11	>	CONTAINS	INCLUDE	DTID 5007 “Fetal Cranium Section”	1-n	U		
12	>	CONTAINS	INCLUDE	DTID 5009 “Fetal Biophysical Profile Section”	1-n	U		
12a	**>**	**CONTAINS**	**INCLUDE**	**DTID newtid1 “Fetal Anatomy Survey Section”**	**1-n**	**U**		
12	>	CONTAINS	INCLUDE	DTID 5011 “Early Gestation Section”	1-n	U		
…								

Kommentiert [KO1]: Scores things like Gross Body Movement, Fetal Breathing, etc.

Content Item Descriptions

Row 6	No purpose of reference is specified.
Row 12a	**The Fetal Anatomy Survey is qualitative, not quantitative. Any measurements and quantitative assessments will appear in other sections, such as the Fetal Biometry Section.**

Create *PS3.16 TID newtid1 as shown*

TID newtid1 Fetal Anatomy Survey Section

This Template contains assessments of fetal anatomy.

Type: **Extensible**
Order: **Non-Significant**
Root: **No**

Table TID newtid1. Fetal Anatomy Survey Section

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (newcode0, DCM, "Fetal Anatomy Survey")	1	M		
2	>	HAS OBS CONTEXT	INCLUDE	DTID 1008 “Subject Context, Fetus”	1	MC	IF this Template is invoked more than once to describe more than one fetus	
4	>	CONTAINS	CODE	DCID newcid1 “Fetal Anatomy Survey Item”	1-n	U		DCID 242 “Normal-Abnormal”
5	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1-n	MC	IF any entries in Row 4 have a value of (263654008, SCT, ”Abnormal”)	*WG6Q Make this a child of Row 4?*

Content Item Descriptions

Row 4	The code (371934000, SCT, “Normality Undetermined”) can be used to represent “Not Visualized”. *WG6Q [Or should we make a new CID that includes (122288, DCM, "Not Visualized") which is defined as “Anatomy could not be visualized for the purpose of evaluation”]?? Or would (373121007 ,SCT, “Not Evaluated”) be better*
Row 5	Descriptive text about any abnormal findings in the anatomy survey.

Modify PS3.16 CID 242 as shown

CID 242 Normal-Abnormal

This Context Group is a subset of CID 222 “Normality”.

Kommentiert [KO2]: CID 222 adds Abnormally High, Abnormally Low

Resources: **HTML | FHIR JSON | FHIR XML | IHE SVS XML**
Type: **Non-Extensible**
Keyword: **NormalAbnormal**
FHIR Keyword: **dicom-cid-242-NormalAbnormal**
Version: **20170914**
UID: **1.2.840.10008.6.1.36**

Kommentiert [KO3]: Oddly, this CID puts Type up here instead of above Version

Table CID 242. Normal-Abnormal

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	17621005	Normal	G-A460	C0205307
SCT	263654008	Abnormal	R-42037	C0205161
SCT	**49608001**	**Not Visualized??**		
SCT	371934000	Normality Undetermined	R-0039B	C1299401

Create *PS3.16 newCID as shown*

CID newcid1 Fetal Anatomy Survey Item

Resources: **HTML | FHIR JSON | FHIR XML | IHE SVS XML**
Keyword: **FetalAnatomySurveyItem**
FHIR Keyword: **dicom-cid-newcid1-FetalAnatomySurveyItem**
Type: **Extensible**
Version: **yyyymmdd**
UID: **1.2.840.10008.6.1.newuid1**

Table CID newcid1. Fetal Anatomy Survey Item

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	89546000	Cranium	T-11100	*Intact, Calcification, Shape*
SCT	80401008 *(Falx Cerebri)*	Midline Falx		
SCT	74968005	Cavum septi pellucidi	T-A1630	C0228158
SCT	80621003	Choroid Plexus	T-A1900	
SCT	119406000	Thalami	T-D0593	C0458271
SCT	119238007	Brain stem	T-D0558	C1268144
SCT	9000002 *(encompasses superior, mid, and inferior peduncles)*	Cerebral peduncles		*with aqueduct of Sylvius*
SCT	66720007	Lateral cerebral ventricles	T-A1650	C0152279
SCT	113305005	Cerebellum	T-A6000	C0007765
SCT	88442005	Corpus callosum	T-A2700	C0010090
		Nuchal fold		
		Intracranial translucency (fourth ventricle)		
SCT	54165005	Cisterna magna	T-A1520	C0008841
		Forehead		

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	363654007	Orbits	T-D14AE	C0029180
SCT	79652003 (Eyeball)	Bulbi	T-AA770	C0229242
		Midsagittal facial profile		
SCT	74386004	Nasal bone	T-11149	C0027422
SCT	72914001	Palate		
SCT	70925003	Maxilla	T-11170	C0024947
		Retronasal triangle		
SCT	11681001	Upper lip		
SCT	91609006	Mandible	T-11180	C0024687
SCT	21974007	Tongue	T-53000	C0040408
SCT	117590005	Ears	T-AB001	
		Jugular cysts		*None in neck.*
		Thoracic wall		*shape*
SCT	816094009	Chest		
		Lung fields		
SCT	5798000	Diaphragm	T-D3400	C0011980 *Diaphragmatic continuity, no hernia*
SCT	113197003	Ribs	T-11300	C0035561
		Heart rhythm		
		(Intrathoracic heart position)		
		Cardiac axis		*To left 30-60deg*
		Cardiac size		*1/3 of thoracic space*
		Aortic arch		
		Superior vena cava		
		Inferior vena cava		
		Left Ventricular Outflow Tract		
		Right Ventricular Outflow Tract		
		Tricuspid regurgitation		
		Antegrade ductus venosus		*A-wave on PW Doppler*
		Ventricles		*distinct*

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
		Stomach		*Position, filled*
		Bladder		*filled*
		Bladder size		*Length/long diam <7mm*
		Bowel		
		Adrenal glands		
		Gallbladder		
		Liver		
		Abdominal wall		*Intact w umbilical insertion*
		Umbilical arteries		*Two, bordering bladder*
		Kidneys		*Bilateral, no pyelectasis*
		Renal arteries		
		Spleen		
		Spine		*Shape, continuity, no defects*
		Upper limbs		*Two, three segments, free movement*
	85562004	Hands	T-D8700	C0018563
		Lower limbs		*Two, three segments, free movement*
	56459004	Feet	T-D9700	C0016504
		Genitalia		
		Placenta		*Size, texture, without cystic appearance*
		Umbilical Cord		*Insertion into placenta*
		Umbilical Cord		*Insertion into fetal abdomen*
		Amniotic membrane		*Dissociated physiologically from chorion*

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Add the following Definitions to Annex D

DICOM Code Definitions (Coding Scheme Designator "DCM" Coding Scheme Version "01")

Code Value	Code Meaning	Definition	Notes
…			
Newcode0	**Fetal Anatomy Survey**	**Report section for qualitative assessment of fetal anatomy**	

<Ed Note – (125005, DCM, Biometry Group) definition looks truncated "Biometric assessment of."