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Digital Imaging and Communications in Medicine (DICOM)

Supplement 249: Ultrasound Fetal Anatomy Survey Structured Report Extensions

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DICOM Standards Committee – Working Group 12

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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.

- 50 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 anatomy surveys. The guidelines identify specific lists of anatomy to consider. E.g.
- 55
- <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>
- 60
- <https://journals.sagepub.com/doi/epub/10.1177/8756479314532221>

OPEN ISSUES:

Q1. Would it be useful to add subsections (e.g. Head/Brain, Neck, Chest, Heart, Abdomen) to the structure of the template and is there international agreement on what those subsections would be?

- 65
- Currently the anatomy survey is a flat list of assessments (with no subsections). If the system doing the display wants to group them, it could do that based on having its own table of what codes go together and what to call the subgroups. If we decided to model this in the DICOM structure, then implementations would have to navigate the structure. This might have implications for processing and display.

- 70 Q2. In newtid1, should Row 4 (Comment) be made a child of Row 3 (Fetal Anatomy Survey Assessment)?

Making it a child would force each comment to be associated with a specific anatomic observation. This might facilitate data mining but might also result in duplication of information. Keeping them as peers, would allow for an “umbrella comment” that discusses multiple abnormal observations. Could also consider having two comment lines, one as a child and one at the top level.

- 75 Q3. Should we incorporate the code (122288, DCM, "Not Visualized"), either adding it to CID 242 or creating a new CID that has Normal, Abnormal, Not Visualized)?

If there is a clear distinction between (371934000, SCT, “Normality Undetermined”) and (122288, DCM, "Not Visualized") (or perhaps (373121007 ,SCT, “Not Evaluated”)) in this context, then it might make sense to add it.

- 80 Q4. in newtid1, should we add a row in for (272741003, SCT, "Laterality")?

Currently, laterality is pre-coordinated if needed. Other OB/GYN reports are inconsistent about pre-coordinating or post-coordinating laterality. Coding laterality would allow use of (51440002, SCT, “Bilateral”) to encode assessments of both left and right which seems common in fetal anatomy surveys.

85 Q5. Should we change all the anatomy codes to use children of (367570001, SCT, “Fetal part”)?

Didn’t stumble across this code sub-tree until final PC preparation. On the one hand, they are specific to our application domain. On the other hand, there might be some value to using anatomy codes that are already familiar/supported, perhaps making it easier to database and correlate pediatric and fetal measurements of the same structure in the same subject.

90 Q6. Can we just use codes for singular body parts even when both are being assessed as a pair?

SNOMED has fewer codes for body part pairs/sets. Again, may be simpler for searching if we don’t introduce additional plural codes.

CLOSED ISSUES:

95 Q1. Is there a need to encode the criteria used by the operator to assess the normality of each piece of anatomy? (E.g. the spine was assessed in terms of shape, continuity, and lack of defects).

A. No. The guidelines provide some guidance (which will vary over time and country) but the operator may look at a variety of things which may go beyond the guidance. Anything of interest will be noted in the Comments.

100 Q2. Is it OK if a couple of the codes in the CID are not strictly pieces of anatomy (e.g. “four chamber view” (of heart))?

A. Yes. That’s OK. They are an assessment conducted during a Fetal Anatomy Survey.

Q3. Should qualitative assessments that are not normal/abnormal go in newtid1?

105 A. No. Keep this survey uniform. Do a CP to add things like Placenta Location (marginal, partial, complete previa, low lying, etc), Placenta Grade (0 to 3), Placenta Cord Insertion Abnormalities (Velamentous, vasa previa, etc), Cardiac Size (mild/mod/severe increased/decreased), Cardiac function (mild/mod/severe impairment of contractility), Cardiac position, Fetal Position (breech, oblique, etc), Presence of Funneling or Cerclage, Cervix description, etc to existing or other new sections.

Changes to NEMA Standards Publication PS3.6

110

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
...	...	...
<u>1.2.840.10008.6.1.newcidUID1</u>	<u>newcid1</u>	<u>Fetal Anatomy Survey Assessment</u>

Changes to NEMA Standards Publication PS3.16

Part 16: Content Mapping Resource

115 *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

120

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	<u>DTID newtid1 "Fetal Anatomy Survey Section"</u>	<u>1-n</u>	<u>U</u>		
12	>	CONTAINS	INCLUDE	DTID 5011 "Early Gestation Section"	1-n	U		
...								

125 Content Item Descriptions

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

Create PS3.16 TID newtid1 as shown

TID newtid1 Fetal Anatomy Survey Section

130 This Template contains assessments of fetal anatomy.

Type: Extensible
Order: Non-Significant
Root: No

135 **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	
3	>	CONTAINS	CODE	DCID newcid1 "Fetal Anatomy Survey Assessment"	1-n	U		DCID 242 "Normal-Abnormal"
4	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1-n	MC	IF any entries in Row 3 have a value of (263654008, SCT, "Abnormal")	

Content Item Descriptions

Row 3	The code (371934000, SCT, "Normality Undetermined") from CID 242 can be used to represent "Not Visualized".
Row 4	Descriptive text about any abnormal findings in the anatomy survey.

140 **Modify** PS3.16 CID 242 as shown

CID 242 Normal-Abnormal

This Context Group is a subset of CID 222 "Normality".

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

150 **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

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	263654008	Abnormal	R-42037	C0205161
SCT	371934000	Normality Undetermined	R-0039B	C1299401

Create PS3.16 newCIDs as shown

Reviewer Notes:

1) In several of the following CIDs a few codes have (*text in italics and parentheses*) below the Code Value. This text indicates the reference code meaning from SNOMED CT. Reviewers are requested to comment on whether that text is sufficiently aligned with the intended DICOM Code Meaning shown in the third column, or whether a different SNOMED or DICOM code should be used instead.

2) In several of the following CIDs a few codes have **SCT** shown as bold/underline. This can be ignored as it is purely for the DICOM editor (to signal to the editor that these codes have not previously been part of the DICOM-SNOMED code set and will need to be added)

CID newcid1 Fetal Anatomy Survey Assessment

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

Table CID newcid1. Fetal Anatomy Survey Assessment

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
<i>Include CID newcid2 "Fetal Anatomy Survey Assessment - Head"</i>				
<i>Include CID newcid3 "Fetal Anatomy Survey Assessment - Face and Neck"</i>				
<i>Include CID newcid5 "Fetal Anatomy Survey Assessment - Thorax"</i>				
<i>Include CID newcid6 "Fetal Anatomy Survey Assessment - Heart"</i>				
<i>Include CID newcid7 "Fetal Anatomy Survey Assessment - Abdomen"</i>				
<i>Include CID newcid8 "Fetal Anatomy Survey Assessment - Extremities"</i>				
SCT	55460000	Fetal Structure		
SCT	71934003	Genitalia		
SCT	78067005	Placenta	T-F1100	C0032043
SCT	29493001	Structure of placental attachment of umbilical cord		
SCT	29870000	Umbilical Cord	T-F1800	C0041633 <i>Insertion into fetal abdomen</i>

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	70847004 (<i>Amnion/ Amniotic Sac</i>)	Amniotic membrane		
SCT	71252005	Cervix	T-83200	

CID newcid2 Fetal Anatomy Survey Assessment - Head

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Keyword: FetalAnatomySurveyAssessmentHead
 FHIR Keyword: dicom-cid-newcid2-FetalAnatomySurveyAssessmentHead
 Type: Extensible
 Version: yyyymmdd
 UID: 1.2.840.10008.6.1.newuid2

Table CID newcid2. Fetal Anatomy Survey Assessment - Head

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	89546000	Cranium	T-11100	
SCT	12738006	Brain	T-A0100	C0006104
<u>SCT</u>	80401008 (<i>Falx Cerebri</i>)	Midline Falx		
SCT	74968005 (<i>Cavum of septum pellucidum</i>)	Cavum septi pellucidi	T-A1630	C0228158
SCT	80621003	Choroid Plexus	T-A1900	
SCT	119406000 (<i>Thalamus</i>)	Thalami	T-D0593	C0458271
SCT	119238007	Brain stem	T-D0558	C1268144
<u>SCT</u>	9000002 (<i>encompasses superior, mid, and inferior peduncles</i>)	Cerebral peduncles		<i>with aqueduct of Sylvius</i>
SCT	66720007 (<i>lateral cerebral ventricle</i>)	Lateral cerebral ventricles	T-A1650	C0152279
SCT	49841001	Third ventricle	T-A1740	C0149555
SCT	35918002	Fourth ventricle	T-A1820	C0149556
SCT	11279006	Circle of Willis	T-45520	
SCT	113305005	Cerebellum	T-A6000	C0007765
SCT	88442005	Corpus callosum	T-A2700	C0010090

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
<u>SCT</u>	83678007	Cerebrum		
<u>SCT</u>	314139009	Cerebral lobe		
<u>SCT</u>	58501004	Cerebellar vermis		
SCT	32361000	Posterior fossa	T-D9310	

CID newcid3 Fetal Anatomy Survey Assessment – Face and Neck

185 **Resources:** HTML | FHIR JSON | FHIR XML | IHE SVS XML
Keyword: FetalAnatomySurveyAssessmentFaceAndNeck
FHIR Keyword: dicom-cid-newcid3-FetalAnatomySurveyAssessmentFaceAndNeck
Type: Extensible
Version: yyyymmdd
 190 **UID:** 1.2.840.10008.6.1.newuid3

Table CID newcid3. Fetal Anatomy Survey Assessment - Face and Neck

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	54165005	Cisterna magna	T-A1520	C0008841
<u>SCT</u>	52795006	Forehead		
SCT	363654007 (Orbit)	Orbits	T-D14AE	C0029180
SCT	79652003 (Eyeball)	Bulbi	T-AA770	C0229242
DCM	Newcode4	Midsagittal facial profile		
SCT	74386004	Nasal bone	T-11149	C0027422
SCT	45206002	Nose	T-21000	
<u>SCT</u>	1797002	Nostril		
<u>SCT</u>	72914001	Palate		
SCT	70925003	Maxilla	T-11170	C0024947
DCM	Newcode03	Retronasal triangle		
<u>SCT</u>	11681001	Upper lip		
SCT	91609006	Mandible	T-11180	C0024687
SCT	21974007	Tongue	T-53000	C0040408
SCT	117590005	Ears	T-AB001	
SCT	45048000	Neck	T-D1600	
DCM	Newcode5	Jugular cyst observation		

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
LN	12102-0	Nuchal fold observation		

195 **CID newcid5 Fetal Anatomy Survey Assessment - Thorax**

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Keyword: FetalAnatomySurveyAssessmentThorax
 FHIR Keyword: dicom-cid-newcid5-FetalAnatomySurveyAssessmentThorax
 Type: Extensible
 200 Version: yyyymmdd
 UID: 1.2.840.10008.6.1.newuid5

Table CID newcid5. Fetal Anatomy Survey Assessment - Thorax

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	78904004	Thoracic wall	T-D3050	C0205076
SCT	816094009	Chest		
<u>SCT</u>	74101002 (both lungs)	Lung fields		
SCT	5798000	Diaphragm	T-D3400	C0011980
SCT	113197003 (Rib)	Ribs	T-11300	C0035561
SCT	9875009	Thymus	T-C8000	
SCT	44567001	Trachea	T-25000	C0040578

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CID newcid6 Fetal Anatomy Survey Assessment - Heart

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Keyword: FetalAnatomySurveyAssessmentHeart
 FHIR Keyword: dicom-cid-newcid6-FetalAnatomySurveyAssessmentHeart
 210 Type: Extensible
 Version: yyyymmdd
 UID: 1.2.840.10008.6.1.newuid6

Table CID newcid6. Fetal Anatomy Survey Assessment - Heart

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Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	80891009	Heart	T-32000	C0018787
<u>SCT</u>	249044008	Fetal Heart Rhythm		
DCM	Newcode6	Cardiac axis		
DCM	Newcode7	Cardiac size		

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	57034009	Aortic arch	T-42300	C0003489
SCT	48345005	Superior vena cava	T-48610	C0042459
SCT	64131007	Inferior vena cava	T-48710	C0042458
SCT	13418002	Left Ventricular Outflow Tract	T-32650	C0225912
SCT	44627009	Right Ventricular Outflow Tract	T-32550	C0225892
SCT	111287006	Tricuspid regurgitation	D3-29042	C0040961
SCT	589001	Interventricular septum	T-32410	C0225870
DCM	Newcode10	Antegrade ductus venosus		
SCT	91746003	Cardiac Ventricles		
DCM	131029	Four-chamber View		
DCM	131025	Three vessel view		
DCM	131026	Three vessel and trachea view		
DCM	131028	Left ventricular outflow tract view		
SCT	399195005	Right ventricular outflow tract view	G-039D	C1275831

CID newcid7 Fetal Anatomy Survey Assessment - Abdomen

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
 Keyword: FetalAnatomySurveyAssessmentAbdomen
 220 FHIR Keyword: dicom-cid-newcid7-FetalAnatomySurveyAssessmentAbdomen
 Type: Extensible
 Version: yyyyymmdd
 UID: 1.2.840.10008.6.1.newuid7

Table CID newcid7. Fetal Anatomy Survey Assessment - Abdomen

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	52731004	Abdominal cavity	T-D4010	
LN	12030-3	Abdominal wall observation		
SCT	69695003	Stomach	T-57000	C0038351
SCT	89837001	Bladder	T-74000	C0005682
DCM	Newcode8	Bladder size		
SCT	113276009	Bowel		
SCT	34402009	Rectum	T-59600	C0034896
SCT	134315000	Adrenal glands		

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
	<i>(Both Adrenal Glands)</i> 23451007 <i>(Adrenal Gland)</i>		T-B3000	C0001625
SCT	28231008	Gallbladder	T-63000	C0016976
SCT	10200004	Liver	T-62000	C0023884
SCT	50536004 <i>(Umbilical Artery)</i>	Umbilical arteries	T-F1810	C0041632
SCT	28463900	Umbilical vein	T-48832	
<u>SCT</u>	17373004 <i>(Both Kidneys)</i>	Kidneys		
SCT	2841007 <i>(Renal Artery)</i>	Renal arteries	T-46600	C0035065
SCT	78961009	Spleen	T-C3000	C0037993
SCT	87953007	Ureter	T-73000	C0041951
SCT	421060004	Spine	T-D04FF	C0037949
SCT	122494005	Cervical Spine	T-11501	C0728985
SCT	122494006	Thoracic Spine	T-11502	C0581269
SCT	122494007	Lumbar Spine	T-11503	C0024091

CID newcid8 Fetal Anatomy Survey Assessment - Extremities

Resources: HTML | FHIR JSON | FHIR XML | IHE SVS XML
Keyword: FetalAnatomySurveyAssessmentExtremities
FHIR Keyword: dicom-cid-newcid8-FetalAnatomySurveyAssessmentExtremities
Type: Extensible
Version: yyyyymmdd
UID: 1.2.840.10008.6.1.newuid8

Table CID newcid8. Fetal Anatomy Survey Assessment - Extremities

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
SCT	53120007 <i>(Upper Limb)</i>	Upper limbs	T-D8000	C1140618
SCT	40983000	Upper arm	T-D8200	
SCT	14975008	Forearm	T-D8500	
SCT	85562004 <i>(Hand)</i>	Hands	T-D8700	C0018563

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
<u>SCT</u>	70327001	All Fingers		
SCT	61685007 (Lower Limb)	Lower limbs	T-D9000	C0023216
SCT	71341001	Femur	T-12710	
SCT	30021000	Lower Leg	T-D9400	
SCT	56459004 (Foot)	Feet	T-D9700	C0016504
<u>SCT</u>	8671006	All Toes		

Add the following Definitions to Annex D

240 DICOM Code Definitions (Coding Scheme Designator “DCM” Coding Scheme Version “01”)

Code Value	Code Meaning	Definition	Notes
...			
<u>Newcode0</u>	<u>Fetal Anatomy Survey</u>	<u>Report section for qualitative assessment of fetal anatomy</u>	
<u>Newcode3</u>	<u>Retronasal triangle</u>	<u>A sonographic landmark comprised of the three echogenic lines formed by the two frontal processes of the maxilla and the palate visualized in the coronal view of the fetal face posterior to the nose. Relevant to early screening for cleft palate.</u>	
<u>Newcode4</u>	<u>Midsagittal facial profile</u>	<u>A view of the face in a sagittal plane roughly on the left-right line of symmetry (i.e. centered on the nose).</u>	
<u>Newcode5</u>	<u>Jugular cyst observation</u>	<u>An observation of whether masses are present in the neck.</u>	<i>Absence of masses in neck</i>
<u>Newcode6</u>	<u>Cardiac axis</u>	<u>A qualitative assessment of the orientation of the axis of the heart (i.e. the line roughly from the apex of the left ventricle to the aortic valve)</u>	<i>Typically to left 30-60deg</i>
<u>Newcode7</u>	<u>Cardiac size</u>	<u>A qualitative assessment of the size of the heart.</u>	<i>1/3 of thoracic space</i>
<u>Newcode8</u>	<u>Bladder size</u>	<u>A qualitative assessment of the size of the bladder.</u>	<i>Length/long diam <7mm</i>
<u>Newcode10</u>	<u>Antegrade ductus venosus</u>	<u>Antegrade blood flow in the ductus venosus.</u>	