Digital Imaging and Communications in Medicine (DICOM)

Supplement 242: Ultrasound Fetal Cardiac 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 cardiac assessments in echo reports.

Current clinical practice and technology for fetal cardiac assessments using ultrasound have progressed since Sup78 was published, which introduced TID 5220 "Pediatric, Fetal and Congenital Cardiac Ultrasound Reports" and sub-template TID 5228 "Cardiac Ultrasound Fetal Measurement Section". Practice now includes many more measurements beyond visual assessment. For example, additions will address:

* measurements of the ventricles, atria, septa and valves,
* measurements of fetal arrhythmia and hemodynamics,
* assessment of the fetal cardiovascular profile score (CVPS)

Both the fetal (TID 5228) and pediatric (TID 5221) templates contain multiple inclusions of TID 5222 which is parameterized with CIDs 12282 through 12294 to address specific pieces of anatomy and corresponding measurements. Many measurements described for pediatric echo are also potentially relevant for fetal echo, particularly at later stages of fetal development. To that end, TID 5221 is now included in TID 5228, making any of those measurements readily available as needed and appropriate.

Also, CID 12279, which is titled Cardiac Ultrasound Fetal General Measurement, is pruned here based on usage experience to list just general fetal measurements that are specifically relevant to cardiac fetal ultrasound. CID 12005 Fetal Biometry Measurement already covers fetal measurements relevant to a non-cardiac fetal ultrasound. Since CID 12279 is extensible, any existing implementations with unexpected usages will not be invalidated.

References:

* Fetal Echo Guideline Japan (Second edition) 2021 (<https://www.jsfc.jp/wp-content/uploads/2021/06/6ca654442ba6819c3183340bba5cf968.pdf>)
* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5030052/>
* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6773963/>

## Open Issues:

1. Are other fetal measurements needed and is a new Root template like TID 5300 warranted with a fully pre-Coordinated codeset?

If a new Root template is created, or perhaps as a modification to TID 5220, a newcid2 could be created for Cardiac Ultrasound Fetal Measurements starting with the column of pre-coordinated codes in Table QQQ. Could also consider corresponding additions to
CID 12259 Cardiac Ultrasound Ventricles Measurement
CID 12263 Cardiac Ultrasound Venous Return Pulmonary Measurement
CID 12264 Cardiac Ultrasound Venous Return Systemic Measurement
CID 12274 Cardiac Ultrasound Aorta Measurement
2. Does the new TID 5228 row for Arterial Duct Arch measurements make sense and is the code right?
3. Is the constraint appropriate on Row 7 of TID 5xx2 to base the score on the doppler flow at the fetal end of the umbilical artery (rather than the middle or placental end)?

## Closed Issues:

Q. Why does TID 5228 Row 8 have multiple containers (1-n) for the same finding site and measurements?

A. To allow different image modes for a given site/measurements perhaps. Otherwise would need to leave image mode blank.

Q. Should we keep Patent Ductus Arteriosus as a Finding Site?

A. No

In the fetal context, Ductus Arteriosus is a valid Finding Site. In the pediatric context, that anatomy normally is gone, but if it persists, the diagnosis is Patent Ductus Arteriosus but the anatomy is still Ductus Arteriosus. In SNOMED, Patent Ductus Arteriosus is a diagnosis code not an anatomy code so it should not be used as a Finding Site. This is consistent with SNOMED having the site of a PDA repair to be "DA".
A New CP is being prepared to fix PDA usage elsewhere in the standard too.

Q. Can we include Left Ventricle Outflow Tract in CID 12291 (Cardiac Ultrasound Aorta Finding Site)?

A. Yes

WG6: Given the "sloppy" practice in the past, this is fine.
While technically this is just before the beginning of the Aorta, the last few existing entries in this CID are already beyond the literal aorta and its parts and measurements are often grouped this way in practice.

Q. Should CID 12291 continue to have codes for all of Descending Aorta, Descending Thoracic Aorta, Thoracic Aorta, and Abdominal Aorta?

A. Yes.

Descending Thoracic Aorta will be used for the LD measurement, but all others might be used in other contexts. None are direct synonyms (i.e. the Venn Diagram has non-overlapping sections)

Q. For UCUM range constraints for the CV Profile Score, can we enumerate values (e.g. 0:1:2)?

A. No.

PS3.16 7.2.2 says the constraints are a min/max value, not an enumeration. We can constrain values in the row description if needed. <https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_7.2.2.html>

Q. What view codes should be used for fetal echo?

A. Create a new CID (per WG12&6)

Literature (<https://obgyn.onlinelibrary.wiley.com/doi/10.1002/uog.2597>) references terms that describe the heart orientation terms (Long-axis view, Short-axis view, Four-chamber view, aortic arch view, and oblique short-axis view) but adjectives describing the placement of the probe with respect to anatomical structures like parasternal, subcostal, transesophageal, etc (see CID 12226) are less relevant because the predictable relationship between the anatomical placement of the probe and the orientation of the heart is no longer fixed. <https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12226.html>

# Changes to NEMA Standards Publication PS3.6

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.newcidUID0** | **newcid0** | **Fetal Echocardiography Image View** |
| **1.2.840.10008.6.1.newcidUID1** | **newcid1** | **Cardiac Ultrasound Fetal Arrhythmia Measurements** |
| **1.2.840.10008.6.1.newcidUID2** | **newcid2** | **Cardiac Ultrasound Fetal Measurements** |

# Changes to NEMA Standards Publication PS3.16

Part 16: Content Mapping Resource

*Modify TID 5220 as shown. TID 5221 is included* ***unchanged*** *for reference.*

*TID 5220 does not have a hierarchical diagram to update.*

### TID 5220 Pediatric, Fetal and Congenital Cardiac Ultrasound Reports

This Template forms the top of a content tree that allows an ultrasound application to describe the results of a Cardiac Ultrasound imaging procedure. It is instantiated at the root node.

**Type: Extensible**

**Order: Significant**

**Root: Yes**

**Table TID 5220. Pediatric, Fetal and Congenital Cardiac Ultrasound Reports**

|  | **NL** | **Rel with Parent** | **VT** | **Concept Name** | **VM** | **Req Type** | **Condition** | **Value Set Constraint** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 |  |  | CONTAINER | D[CID 12245 “Cardiac Ultrasound Report Title”](#sect_CID_12245) | 1 | M |  | Root node |
| 2 | > | HAS CONCEPT MOD | INCLUDE | D[TID 1204 “Language of Content Item and Descendants”](#sect_TID_1204) | 1 | M |  |  |
| 3 | > | HAS OBS CONTEXT | INCLUDE | D[TID 1001 “Observation Context”](#sect_TID_1001) | 1 | M |  |  |
| 4 | > | CONTAINS | CONTAINER | EV [(18785-6, LN, "Indications for Procedure")](http://loinc.org/18785-6/) | 1 | U |  |  |
| 5 | >> | CONTAINS | CODE | EV [(121071, DCM, "Finding")](#DCM_121071) | 1-n | U |  | D[CID 12246 “Cardiac Ultrasound Indication for Study”](#sect_CID_12246) |
| 6 | >> | CONTAINS | TEXT | EV [(121071, DCM, "Finding")](#DCM_121071) | 1 | U |  |  |
| 7 | > | CONTAINS | INCLUDE | D[TID 3802 “Cardiovascular Patient History”](#sect_TID_3802) | 1 | U |  |  |
| 8 | > | CONTAINS | INCLUDE | D[TID 3602 “Cardiovascular Patient Characteristics”](#sect_TID_3602) | 1 | U |  |  |
| 9 | > | CONTAINS | INCLUDE | D[TID 5225 “Cardiac Ultrasound Fetal Characteristics”](#sect_TID_5225) | 1-n | U |  | No more than one inclusion per fetus |
| 10 | > | CONTAINS | INCLUDE | D[TID 5226 “Cardiac Ultrasound Summary Section”](#sect_TID_5226) | 1 | U |  |  |
| 11 | > | CONTAINS | INCLUDE | D[TID 5227 “Cardiac Ultrasound Fetal Summary Section”](#sect_TID_5227) | 1-n | U |  | No more than one inclusion per fetus |
| 12 | > | CONTAINS | CONTAINER | EV [(111028, DCM, "Image Library")](#DCM_111028) | 1 | U |  |  |
| 13 | >> | CONTAINS | IMAGE |  | 1-n | M |  |  |
| 14 | > | CONTAINS | INCLUDE | D[TID 5221 “Cardiac Ultrasound Pediatric Echo Measurement Section”](#sect_TID_5221) | 1 | U |  |  |
| 15 | > | CONTAINS | INCLUDE | D[TID 5228 “Cardiac Ultrasound Fetal Measurement Section”](#sect_TID_5228) | 1-n | UC | For Fetal Report only. | No more than one inclusion per fetus |
| **16** | **>** | **CONTAINS** | **INCLUDE** | **DTID 5xx2 "Fetal Cardiovascular Profile Section"** | **1-n** | **UC** | **For Fetal Report only.** | **No more than one inclusion per fetus** |

**Content Item Descriptions**

|  |  |
| --- | --- |
| Row 3 | For Fetal Report, this row establishes the subject context of the mother. |
| Row 7 | For Fetal Report, this row will be the patient history of the mother. |
| Row 8 | For Fetal Report, this row will be the Patient Characteristics for the mother. |
| Row 10 | For Fetal Report, this row will be the Summary Section for the mother. |
| Row 13 | No purpose of reference is specified. |
| **Row 14** | **This inclusion of TID 5221 is for pediatric usage. For fetal usage, see Row 9 of TID 5228 where TID 5221 is included and is associated with a specific Fetus Context.** |

### TID 5221 Cardiac Ultrasound Pediatric Echo Measurement Section

**Type: Extensible**

**Order: Significant**

**Root: No**

**Table TID 5221. Cardiac Ultrasound Pediatric Echo Measurement Section**

|  | **NL** | **Rel with Parent** | **VT** | **Concept Name** | **VM** | **Req Type** | **Condition** | **Value Set Constraint** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12282 “Cardiac Ultrasound Venous Return Systemic Finding Site”](#sect_CID_12282)$MeasType = D[CID 12264 “Cardiac Ultrasound Venous Return Systemic Measurement”](#sect_CID_12264) |
| 2 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12283 “Cardiac Ultrasound Venous Return Pulmonary Finding Site”](#sect_CID_12283)$MeasType = D[CID 12263 “Cardiac Ultrasound Venous Return Pulmonary Measurement”](#sect_CID_12263) |
| 3 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12284 “Cardiac Ultrasound Atria and Atrial Septum Finding Site”](#sect_CID_12284)$MeasType = D[CID 12265 “Cardiac Ultrasound Atria and Atrial Septum Measurement”](#sect_CID_12265) |
| 4 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12285 “Cardiac Ultrasound Atrioventricular Valve Finding Site”](#sect_CID_12285)$MeasType = D[CID 12268 “Cardiac Ultrasound Atrioventricular Valve Measurement”](#sect_CID_12268) |
| 5 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12286 “Cardiac Ultrasound Interventricular Septum Finding Site”](#sect_CID_12286)$MeasType = D[CID 12269 “Cardiac Ultrasound Interventricular Septum Measurement”](#sect_CID_12269) |
| 6 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12287 “Cardiac Ultrasound Ventricle Finding Site”](#sect_CID_12287)$MeasType = D[CID 12259 “Cardiac Ultrasound Ventricles Measurement”](#sect_CID_12259) |
| 8 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12288 “Cardiac Ultrasound Outflow Tract Finding Site”](#sect_CID_12288)$MeasType = D[CID 12271 “Cardiac Ultrasound Outflow Tract Measurement”](#sect_CID_12271) |
| 9 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12289 “Cardiac Ultrasound Semilunar Valve, Annulus and Sinus Finding Site”](#sect_CID_12289)$MeasType = D[CID 12272 “Cardiac Ultrasound Semilunar Valve, Annulate and Sinus Measurement”](#sect_CID_12272) |
| 10 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12290 “Cardiac Ultrasound Pulmonary Artery Finding Site”](#sect_CID_12290)$MeasType = D[CID 12260 “Cardiac Ultrasound Pulmonary Artery”](#sect_CID_12260) |
| 11 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12291 “Cardiac Ultrasound Aorta Finding Site”](#sect_CID_12291)$MeasType = D[CID 12274 “Cardiac Ultrasound Aorta Measurement”](#sect_CID_12274) |
| 12 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12292 “Cardiac Ultrasound Coronary Artery Finding Site”](#sect_CID_12292)$MeasType = D[CID 12275 “Cardiac Ultrasound Coronary Artery Measurement”](#sect_CID_12275) |
| 13 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12293 “Cardiac Ultrasound Aortopulmonary Connection Finding Site”](#sect_CID_12293)$MeasType = D[CID 12276 “Cardiac Ultrasound Aorto Pulmonary Connection Measurement”](#sect_CID_12276) |
| 14 |  |  | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = D[CID 12294 “Cardiac Ultrasound Pericardium and Pleura Finding Site”](#sect_CID_12294)$MeasType = D[CID 12277 “Cardiac Ultrasound Pericardium and Pleura Measurement”](#sect_CID_12277) |

*Modify TID 5228 as shown.*

*Brings in pediatric echo measurements applicable to fetal echo and adds post-coordinated echo measurements to handle most of the new measurements introduced by this supplement.*

*Background (Drop before Ballot):*

*TID 5221 is just a list of optional TID 5222 includes without context or a container so no extra nesting is caused by invoking it here. With full optionality, TID 5221 is already a case of "use whichever of these you find appropriate". It includes finding sites and measurements for:*

*- Venous Return Systemic Meas.
- Venous Return Pulmonary Meas.
- Atria and Atrial Septum Meas.
- Atrioventricular Valve Meas.
- Intraventricular Septum Meas.
- Ventricular Meas.
- Aorta Meas.
- Outflow Tract Meas.
- Pulmonary Artery Meas.
- Coronary Artery Meas.
- Semilunar Valve, Annulus and Sinus Meas.
- Aortopulmonary Connection Meas.
- Pericardium and Pleura Meas.*

### TID 5228 Cardiac Ultrasound Fetal Measurement Section

**Type: Extensible**

**Order: Significant**

**Root: No**

Table TID 5228. Cardiac Ultrasound Fetal Measurement Section

|  | **NL** | **Rel with Parent** | **VT** | **Concept Name** | **VM** | **Req Type** | **Condition** | **Value Set Constraint** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 |  |  | CONTAINER | EV [(125016, DCM, "Fetal Measurements")](#DCM_125016) | 1 | M |  |  |
| 2 | > | HAS OBS CONTEXT | INCLUDE | D[TID 1008 “Subject Context, Fetus”](#sect_TID_1008) | 1 | MC | IF this Template is invoked more than once to describe more than one fetus. |  |
| 3 | > | CONTAINS | INCLUDE | D[TID 300 “Measurement”](#sect_TID_300) | 1-n | U |  | $Measurement = D[CID 12279 “Cardiac Ultrasound Fetal General Measurement”](#sect_CID_12279) |
| 4 | > | CONTAINS | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = EV [(4432005, SCT, "Ductus arteriosus")](http://snomed.info/id/4432005)$MeasType = D[CID 12218 “Echocardiography Congenital”](#sect_CID_12218) |
| **4a** | **>** | **CONTAINS** | **INCLUDE** | **D**[**TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”**](#sect_TID_5222) | **1-n** | **U** |  | **$SectionSubject = EV** [**(newcode21, DCM, "Arterial Duct Arch")**](http://snomed.info/id/4432005)**$MeasType = D**[**CID 12218 “Echocardiography Congenital”**](#sect_CID_12218) |
| 5 | > | CONTAINS | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = EV [(367624001, SCT, "Ductus venosus")](http://snomed.info/id/367624001)$MeasType = D[CID 12218 “Echocardiography Congenital”](#sect_CID_12218) |
| 6 | > | CONTAINS | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = EV [(50536004, SCT, "Umbilical artery")](http://snomed.info/id/50536004)$MeasType = D[CID 12218 “Echocardiography Congenital”](#sect_CID_12218) |
| 7 | > | CONTAINS | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = EV [(367567000, SCT, "Umbilical vein")](http://snomed.info/id/367567000)$MeasType = D[CID 12218 “Echocardiography Congenital”](#sect_CID_12218) |
| 8 | > | CONTAINS | INCLUDE | D[TID 5222 “Pediatric, Fetal and Congenital Cardiac Ultrasound Section”](#sect_TID_5222) | 1-n | U |  | $SectionSubject = EV [(17232002, SCT, "Middle cerebral artery")](http://snomed.info/id/17232002)$MeasType = D[CID 12218 “Echocardiography Congenital”](#sect_CID_12218) |
| **9** | **>** | **CONTAINS** | **INCLUDE** | **D**[**TID 5221 “Cardiac Ultrasound Pediatric Echo Measurement Section”**](#sect_TID_5222) | **1** | **U** |  |  |
| **10** | **>** | **CONTAINS** | **INCLUDE** | **DTID 5xxx "Cardiac Ultrasound Post-Coordinated Measurement Section"** | **1-n** | **U** |  |  |

**Content Item Descriptions**

|  |  |
| --- | --- |
| **Row 9** | **This inclusion of TID 5221 facilitates the use of any pediatric echo measurement(s) appropriate for fetal assessment. Some measurements might only be appropriate for late stage fetal assessment. None of the TID 5221 content is inherently pediatric-specific.** |
| **Row 10** | **This row permits inclusion of section containers with one or more fully post-coordinated echo measurements.** |

*Add (micro) TID 5xxx for a section of Post-Coordinated Echo Measurements*

### TID 5xxx Cardiac Ultrasound Post-Coordinated Measurement Section

**Type: Extensible**

**Order: Significant**

**Root: No**

Table TID 5xxx. Cardiac Ultrasound Post-Coordinated Measurement Section

|  | **NL** | **Rel with Parent** | **VT** | **Concept Name** | **VM** | **Req Type** | **Condition** | **Value Set Constraint** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** |  |  | **CONTAINER** | **EV (59776-5, LN, "Findings")** | **1** | **U** |  |  |
| **2** | **>** | **CONTAINS** | **INCLUDE** | **DTID 5302 "Post-Coordinated Echo Measurement"** | **1-n** | **U** |  |  |

**Content Item Descriptions**

|  |  |
| --- | --- |
| **Row 2** | **Each inclusion of this row is one fully post-coordinated echo measurement.** **See Table QQQ Examples of Post-Coordination of Fetal Cardiac Ultrasound Measurements for a list of common fetal cardiac measurements and the corresponding values of post-coordinated elements of TID 5302.** |

*Table QQQ follows the example and precedent of the Multi-energy CT Table in PS3.3 C.11.1.1.2.1.
Since example tables are not usually found mixed among the TID tables, QQQ may be moved to a PS3.16 Annex, or to a PS3.17 Section, but for Public Comment this is a convenient location for reviewers to see the material.*

Table QQQ. Examples of Post-Coordination of Fetal Cardiac Ultrasound Measurements

|  |  |  |  |
| --- | --- | --- | --- |
| **Nominal Measurement (Row 1 of TID 5302)** | **Key Post-Coordinated Elements of TID 5302** | **Pre-Coord** | **Notes** |
| **Finding****Site** | **Measured****Property** | **Image****Mode** | **Cardiac****Cycle****Point** |  |  |
| **Measurement Type = Direct** |
| PV S-wave S peak velocity | Pulmonary Vein | Peak Blood Vel | PW Dop | S-wave | LN 79917-1 |  |
| PV D-wave D peak velocity | Pulmonary Vein | Peak Blood Vel | PW Dop | D-wave | LN 79916-3 |  |
| IVC S-wave S peak velocity | Inferior Vena Cava | Peak Blood Flow | PW Dop | S-wave |  |  |
| Mitral valve annulus diameter | Mitral Valve Annulus | Diameter | 2D | Diastole |  |  |
| Tricuspid valve annulus diameter | Tricuspid Valve Annulus | Diameter | 2D | Diastole |  |  |
| a-wave a peak velocity (mitral) | Mitral Valve | Peak Blood Vel | PW Dop | A-wave | LN 80066-4 |  |
| a-wave a peak velocity (tricuspid) | Tricuspid Valve | Peak Blood Vel | PW Dop | A-wave | LN 79923-9 |  |
| IVC a-wave a peak velocity | Inferior Vena Cava | Peak Blood Flow | PW Dop | A-wave |  |  |
| E-wave peak velocity (mitral) | Mitral Valve | Peak Blood Vel | PW Dop | E-wave | LN 80070-6 |  |
| E-wave peak velocity (tricuspid) | Tricuspid Valve | Peak Blood Vel | PW Dop | E-wave | LN 79925-4 |  |
| e' peak velocity sep (mitral) | Medial Mitral Annulus | Peak Tissue Vel | TDI | E-wave | LN 78185-6 |  |
| a' peak velocity sep (mitral) | Medial Mitral Annulus | Peak Tissue Vel | TDI | A-wave | LN 81396-4 |  |
| s' peak velocity sep (mitral) | Medial Mitral Annulus | Peak Tissue Vel | TDI | S-wave | LN 78187-2 |  |
| e' peak velocity lat (mitral) | Lateral Mitral Annulus | Peak Tissue Vel | TDI | E-wave | LN 78186-4 |  |
| a' peak velocity lat (mitral) | Lateral Mitral Annulus | Peak Tissue Vel | TDI | A-wave | LN 81397-2 |  |
| s' peak velocity lat (mitral) | Lateral Mitral Annulus | Peak Tissue Vel | TDI | S-wave | LN 78188-0 |  |
| LVOT VTI | LV Outflow Tract | VTI | PW Dop | Systole | LN 80030-0 | Flow=Antegrade |
| RVOT VTI | RV Outflow Tract | VTI | PW Dop | Systole | LN 80089-6 | Flow=Antegrade |
| LV Stroke Volume | Left Ventricle | Stroke Volume | PW Dop | Systole |  | Method=Doppler Volume Flow |
| RV Stroke Volume | Right Ventricle | Stroke Volume | PW Dop | Systole |  | Method=Doppler Volume Flow |
| LVCO (Left Ventricle Cardiac Output) | Left Ventricle | Cardiac Output | PW Dop | Full Cycle |  | To index by fetal weight, Measurement Type would be Indexed, and Measurement Divisor would be Fetal Weight, the value of which would be recorded elsewhere. |
| RVCO (Right Ventricle Cardiac Output) | Right Ventricle | Cardiac Output | PW Dop | Full Cycle |  |  |
| CCO (Combined Cardiac Output) | Heart | Cardiac Output | PW Dop | Full Cycle |  |  |
| DA (Descending Aorta Diameter) | Descending Aorta | Diameter | B-mode | n/a | LN 18013-3 |  |
| UA RI Resistivity Index (RI) | (newcode27, DCM, "Umbilical Artery at Fetus") | Resistivity index | PW Dop | Full Cycle | LN 12018-8 |  |
| Fetal ACA Resistivity Index | (60176003, SCT, "Anterior Cerebral Artery") | Resistivity index | PW Dop | Full Cycle | LN 12012-1 |  |
| Fetal MCA Resistivity Index  | (17232002, SCT, "Middle Cerebral Artery") | Resistivity index | PW Dop | Full Cycle | LN 12014-7 |  |
| UA Pulsatility Index (PI) | (newcode27, DCM, "Umbilical Artery at Fetus") | Pulsatility Index | PW Dop | Full Cycle | LN 12003-0 |  |
| MCA Pulsatility Index  | (17232002, SCT, "Middle Cerebral Artery") | Pulsatility Index | PW Dop | Full Cycle | LN 11999-0 |  |
| PV VTI Forward | Pulmonary Vein | VTI | PW Dop | D-Wave |  | Flow=Antegrade |
| PV VTI Reverse | Pulmonary Vein | VTI | PW Dop | S-Wave |  | Flow=Retrograde |
| **Measurement Type = Ratio** |
| PV VTIR/VTIF ratio | Pulmonary Vein | VTI | PW Dop | Full Cycle |  | Measurement Divisor = PV VTIF |
| E/e' sep ratio (mitral) | Mitral Valve | Peak Blood Vel | PW Dop | E-Wave | LN 78189-9 | Measurement Divisor = e' peak velocity sep (mitral)  |
| E/e' lat ratio (mitral) | Mitral Valve | Peak Blood Vel | PW Dop | E-Wave | LN 78190-6 | Measurement Divisor = e' peak velocity lat (mitral)  |
| CPR Cerebroplacental Ratio  | (17232002, SCT, "Middle Cerebral Artery") | Pulsatility Index | PW Dop | Full Cycle | DCM newcode09 | Measurement Divisor = Umbilical Artery Pulsatility Index |
| Umbilicocerebral Ratio  | (newcode27, DCM, "Umbilical Artery at Fetus") | Pulsatility Index | PW Dop | Full Cycle | DCM newcode10 | Measurement Divisor = MCA Pulsatility Index |
| IVC Preload index (a/S) | Inferior Vena Cava | Peak Blood Vel | PW Dop | A-Wave | DCM Newcode11 | Flow=Retrograde (during numerator) Measurement Divisor = IVC S-wave S peak velocity |
| IVC S/a | Inferior Vena Cava | Peak Blood Vel | PW Dop | S-wave | DCM Newcode12 | Flow=Antegrade (during numerator) Measurement Divisor = IVC a-wave a peak velocity |

*Add TID 5xx2 for a Fetal Cardiovascular Profile Score Section (following the pattern of* [*TID 5009*](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_TID_5009.html) *Fetal Biophysical Profile Section)*

This Template encodes scoring observations for fetal cardiovascular well-being evaluation and a summary Cardiovascular Profile Score (CVPS) as described by Makikallio et al, Human fetal cardiovascular profile score and neonatal outcome in intrauterine growth restriction. Ultrasound Obstet Gynecol 2008; 31: 48‒54 (<https://obgyn.onlinelibrary.wiley.com/doi/10.1002/uog.5210>)

### TID 5xx2 Fetal Cardiovascular Profile Section

**Type: Extensible**

**Order: Significant**

**Root: No**

Table TID 5xx2. Fetal Cardiovascular Profile Section

|  | **NL** | **Rel with Parent** | **VT** | **Concept Name** | **VM** | **Req Type** | **Condition** | **Value Set Constraint** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** |  |  | **CONTAINER** | **DT (newcode30, DCM, "Fetal Cardiovascular Profile")** | **1** | **M** |  |  |
| **2** | **>** | **HAS OBS CONTEXT** | **INCLUDE** | **D**[**TID 1008 “Subject Context, Fetus”**](#sect_TID_1008) | **1** | **MC** | **IF this Template is invoked more than once to describe more than one fetus.** |  |
| **3** | **>** | **CONTAINS** | **NUM** | **EV (newcode31, DCM, "Hydrops Fetalis Score")** | **1** | **MC** | **At least one of Row 3-7 shall be present** | **UNITS = DT ({0:2}, UCUM, "range 0:2")** |
| **4** | **>** | **CONTAINS** | **NUM** | **EV (newcode32, DCM, "Cardiothoracic Size Ratio Score")** | **1** | **MC** | **At least one of Row 3-7 shall be present** | **UNITS = DT ({0:2}, UCUM, "range 0:2")** |
| **5** | **>** | **CONTAINS** | **NUM** | **EV (newcode33, DCM, "Cardiac Function Score")** | **1** | **MC** | **At least one of Row 3-7 shall be present** | **UNITS = DT ({0:2}, UCUM, "range 0:2")** |
| **6** | **>** | **CONTAINS** | **NUM** | **EV (newcode34, DCM, "Venous Doppler Score")** | **1** | **MC** | **At least one of Row 3-7 shall be present** | **UNITS = DT ({0:2}, UCUM, "range 0:2")** |
| **7** | **>** | **CONTAINS** | **NUM** | **EV (newcode35, DCM, "Arterial Doppler Score")** | **1** | **MC** | **At least one of Row 3-7 shall be present** | **UNITS = DT ({0:2}, UCUM, "range 0:2")** |
| **8** | **>** | **CONTAINS** | **NUM** | **EV (newcode36, DCM, "Fetal Cardiovascular Profile Score")** | **1** | **U** |  |  |

**Content Item Descriptions**

|  |  |
| --- | --- |
| **Rows 3-7** | **The numeric profile scores shall have a value of 0, 1, or 2 only.**  |
| **Row 6** | **The score is based on observations of the umbilical vein and ductus venosus.** |
| **Row 7** | **The score is based on observations of the umbilical artery proximal to the fetus.** |
| **Row 8** | **The sum of Rows 3-7. The range is from 0 to the maximum possible score according the items​ scored in Rows 3-7.** |

*Modify CID 12264 to include newcid1 Fetal Arrhythmia Measurements (which Row 1 of TID 5221 pairs with CID 12282 locations, supporting these measures being performed in places like the Superior Vena Cava)*

### CID 12264 Cardiac Ultrasound Venous Return Systemic Measurement

**Resources:** [**HTML**](http://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12279.html) **|** **FHIR JSON** **|** **FHIR XML** **|** **IHE SVS XML**

**Keyword: CardiacUltrasoundVenousReturnSystemicMeasurement**

**FHIR Keyword: dicom-cid-12264-CardiacUltrasoundVenousReturnSystemicMeasurement**

**Type: Extensible**

**Version: 20yymmdd~~100317~~**

**UID: 1.2.840.10008.6.1.845**

Table CID 12264. Cardiac Ultrasound Venous Return Systemic Measurement

| **Coding Scheme Designator** | **Code Value** | **Code Meaning** |
| --- | --- | --- |
| Include [CID 12220 “Echocardiography Common Measurement”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12220.html) |
| Include [CID 12222 “Orifice Flow Property”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12222.html) |
| Include [CID 12239 “Cardiac Output Property”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12239.html) |
| Include [CID 12250 “Cardiac Ultrasound Common Linear Measurement”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12250.html) |
| Include [CID 12252 “Cardiac Ultrasound Cardiac Function”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12252.html) |
| Include [CID 12253 “Cardiac Ultrasound Area Measurement”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12253.html) |
| Include [CID 12254 “Cardiac Ultrasound Hemodynamic Measurement”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12254.html) |
| Include [CID 3612 “Blood Velocity Measurement”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_3612.html) |
| **Include CID newcid1 "Cardiac Ultrasound Fetal Arrhythmia Measurements"** |

*Modify CID 12271 to include newcid1 Fetal Arrhythmia Measurements (which Row 8 of TID 5221 pairs with CID 12288 locations, supporting these measures being performed at the ventricles and their outflow tracts).*

### CID 12271 Cardiac Ultrasound Outflow Tract Measurement

**Resources:** [**HTML**](http://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12279.html) **|** **FHIR JSON** **|** **FHIR XML** **|** **IHE SVS XML**

**Keyword: CardiacUltrasoundOutflowTractMeasurement**

**FHIR Keyword: dicom-cid-12271-CardiacUltrasoundOutflowTractMeasurement**

**Type: Extensible**

**Version: 20yymmdd~~100317~~**

**UID: 1.2.840.10008.6.1.852**

Table CID 12271. Cardiac Ultrasound Outflow Tract Measurement

| **Coding Scheme Designator** | **Code Value** | **Code Meaning** |
| --- | --- | --- |
| Include [CID 12257 “Cardiac Ultrasound Left Ventricle Measurement”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12257.html) |
| Include [CID 12258 “Cardiac Ultrasound Right Ventricle Measurement”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12258.html) |
| Include [CID 12262 “Cardiac Ultrasound Pulmonary Valve Measurement”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12262.html) |
| Include [CID 12270 “Cardiac Ultrasound Aortic Valve Measurement”](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12270.html) |
| **Include CID newcid1 "Cardiac Ultrasound Fetal Arrhythmia Measurements"** |

*Modify CID 12274 to include Left Atrium Descending Aorta Distance measurement*

### CID 12274 Cardiac Ultrasound Aorta Measurement

**Resources:** [**HTML**](http://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12279.html) **|** **FHIR JSON** **|** **FHIR XML** **|** **IHE SVS XML**

**Keyword: CardiacUltrasoundAortaMeasurement**

**FHIR Keyword: dicom-cid-12274-CardiacUltrasoundAortaMeasurement**

**Type: Extensible**

**Version: 20yymmdd~~100317~~**

**UID: 1.2.840.10008.6.1.855**

Table CID 12274. Cardiac Ultrasound Aorta Measurement

| **Coding Scheme Designator** | **Code Value** | **Code Meaning** | **SNOMED-RT ID** | **UMLS Concept Unique ID** |
| --- | --- | --- | --- | --- |
| … |  |  |  |  |
| **DCM** | [**newcode03**](http://loinc.org/59073-7/) | **Left Atrium-Descending Aorta Distance** |  |  |

*Modify CID 12279 to match its intent/title by removing items not commonly recognized as being relevant to a cardiac ultrasound of a fetus.*

*All the retained codes are either measurements of cardiac/vascular features, or measurements commonly used to provide context for cardiac measurements, e.g. by providing a fetal body size reference*

*CID 12004 contains ratios used elsewhere for fetal growth tracking, not heart assessment.*

### CID 12279 Cardiac Ultrasound Fetal General Measurement

**Resources:** [**HTML**](http://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12279.html) **|** **FHIR JSON** **|** **FHIR XML** **|** **IHE SVS XML**

**Keyword: CardiacUltrasoundFetalGeneralMeasurement**

**FHIR Keyword: dicom-cid-12279-CardiacUltrasoundFetalGeneralMeasurement**

**Type: Extensible**

**Version: 20yymmdd~~100317~~**

**UID: 1.2.840.10008.6.1.859**

Table CID 12279. Cardiac Ultrasound Fetal General Measurement

| **Coding Scheme Designator** | **Code Value** | **Code Meaning** | **SNOMED-RT ID** | **UMLS Concept Unique ID** |
| --- | --- | --- | --- | --- |
| ***~~Include~~*** [***~~CID 12004 “Fetal Biometry Ratio”~~***](#sect_CID_12004) |  |  |
| LN | [11988-3](http://loinc.org/11988-3/) | Thoracic Circumference |  | [C0552104](http://uts.nlm.nih.gov/uts/umls/concept/C0552104) |
| LN | [33068-8](http://loinc.org/33068-8/) | Thoracic Area |  | [C1315539](http://uts.nlm.nih.gov/uts/umls/concept/C1315539) |
| LN | [59073-7](http://loinc.org/59073-7/) | Cardiac Circumference, transverse by US |  | [C2923390](http://uts.nlm.nih.gov/uts/umls/concept/C2923390) |
| LN | [59074-5](http://loinc.org/59074-5/) | Cardiothoracic Circumference Ratio |  | [C2923392](http://uts.nlm.nih.gov/uts/umls/concept/C2923392) |
| LN | [59075-2](http://loinc.org/59075-2/) | Cardiac Cross-sectional Area, transverse by US |  | [C2923394](http://uts.nlm.nih.gov/uts/umls/concept/C2923394) |
| LN | [59076-0](http://loinc.org/59076-0/) | Cardiothoracic Area Ratio |  | [C2923396](http://uts.nlm.nih.gov/uts/umls/concept/C2923396) |
| **~~LN~~** | **~~[11820-8](http://loinc.org/11820-8/)~~** | **~~Biparietal Diameter~~** |  | **~~[C0551937](http://uts.nlm.nih.gov/uts/umls/concept/C0551937)~~** |
| **~~LN~~** | **~~[33069-6](http://loinc.org/33069-6/)~~** | **~~Nuchal Translucency~~** |  | **~~[C1315540](http://uts.nlm.nih.gov/uts/umls/concept/C1315540)~~** |
| **~~LN~~** | **~~[11963-6](http://loinc.org/11963-6/)~~** | **~~Femur Length~~** |  | **~~[C0552080](http://uts.nlm.nih.gov/uts/umls/concept/C0552080)~~** |
| **~~LN~~** | **~~[11979-2](http://loinc.org/11979-2/)~~** | **~~Abdominal Circumference~~** |  | **~~[C0552095](http://uts.nlm.nih.gov/uts/umls/concept/C0552095)~~** |
| **~~LN~~** | **~~[11818-2](http://loinc.org/11818-2/)~~** | **~~Anterior-Posterior Abdominal Diameter~~** |  | **~~[C0551935](http://uts.nlm.nih.gov/uts/umls/concept/C0551935)~~** |
| **~~LN~~** | **~~[11819-0](http://loinc.org/11819-0/)~~** | **~~Anterior-Posterior Trunk Diameter~~** |  | **~~[C0551936](http://uts.nlm.nih.gov/uts/umls/concept/C0551936)~~** |
| **~~LN~~** | **~~[11824-0](http://loinc.org/11824-0/)~~** | **~~BPD area corrected~~** |  | **~~[C0551941](http://uts.nlm.nih.gov/uts/umls/concept/C0551941)~~** |
| **~~LN~~** | **~~[11860-4](http://loinc.org/11860-4/)~~** | **~~Cisterna Magna Length~~** |  | **~~[C0551977](http://uts.nlm.nih.gov/uts/umls/concept/C0551977)~~** |
| **~~LN~~** | **~~[11984-2](http://loinc.org/11984-2/)~~** | **~~Head Circumference~~** |  | **~~[C0552100](http://uts.nlm.nih.gov/uts/umls/concept/C0552100)~~** |
| **~~LN~~** | **~~[11851-3](http://loinc.org/11851-3/)~~** | **~~Occipital-Frontal Diameter~~** |  | **~~[C0551968](http://uts.nlm.nih.gov/uts/umls/concept/C0551968)~~** |
| **~~LN~~** | **~~[11862-0](http://loinc.org/11862-0/)~~** | **~~Transverse Abdominal Diameter~~** |  | **~~[C0551979](http://uts.nlm.nih.gov/uts/umls/concept/C0551979)~~** |
| **~~LN~~** | **~~[11863-8](http://loinc.org/11863-8/)~~** | **~~Transverse Cerebellar Diameter~~** |  | **~~[C0551980](http://uts.nlm.nih.gov/uts/umls/concept/C0551980)~~** |
| LN | [11864-6](http://loinc.org/11864-6/) | Transverse Thoracic Diameter |  | [C0551981](http://uts.nlm.nih.gov/uts/umls/concept/C0551981) |
| LN | [59077-8](http://loinc.org/59077-8/) | Foramen Ovale Diameter/Aortic Root Diameter |  | [C2923398](http://uts.nlm.nih.gov/uts/umls/concept/C2923398) |
| LN | [59078-6](http://loinc.org/59078-6/) | Left Ventricle/Right Ventricle Diameter Ratio |  | [C2923400](http://uts.nlm.nih.gov/uts/umls/concept/C2923400) |
| SCT | [249192005](http://snomed.info/id/249192005) | Number of umbilical arteries | [F-00AA0](http://snomed.info/id/249192005) | [C0426250](http://uts.nlm.nih.gov/uts/umls/concept/C0426250) |

*Modify CID 12290 to add several codes*

### CID 12290 Cardiac Ultrasound Pulmonary Artery Finding Site

**Resources:** [**HTML**](http://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12290.html) **|** **FHIR JSON** **|** **FHIR XML** **|** **IHE SVS XML**

**Keyword: CardiacUltrasoundPulmonaryArteryFindingSite**

**FHIR Keyword: dicom-cid-12290-CardiacUltrasoundPulmonaryArteryFindingSite**

**Type: Extensible**

**Version: ~~20100317~~yyyymmdd**

**UID: 1.2.840.10008.6.1.870**

**Table CID 12290. Cardiac Ultrasound Pulmonary Artery Finding Site**

| **Coding Scheme Designator** | **Code Value** | **Code Meaning** | **SNOMED-RT ID** | **UMLS Concept Unique ID** |
| --- | --- | --- | --- | --- |
| SCT | [45341000](http://snomed.info/id/45341000) | Pulmonary Trunk | [T-44100](http://snomed.info/id/45341000) | [C0034052](http://uts.nlm.nih.gov/uts/umls/concept/C0034052) |
| **SCT** | **50408007** | **Left Pulmonary Artery** | **T-44400** | **C0226069** |
| **SCT** | **78480002** | **Right Pulmonary Artery** | **T-44200** | **C0226054** |
| SCT | [81040000](http://snomed.info/id/81040000) | Pulmonary Artery | [T-44000](http://snomed.info/id/81040000) | [C0034052](http://uts.nlm.nih.gov/uts/umls/concept/C0034052) |
| SCT | [443096004](http://snomed.info/id/443096004) | Aorta to Pulmonary Artery Connection | [T-D0877](http://snomed.info/id/443096004) | [C2732457](http://uts.nlm.nih.gov/uts/umls/concept/C2732457) |
| **SCT** | **4432005** | **Ductus Arteriosus** | **T-F6845** |  |

*Modify CID 12291 to add two codes*

### CID 12291 Cardiac Ultrasound Aorta Finding Site

**Resources:** [**HTML**](http://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12291.html) **|** **FHIR JSON** **|** **FHIR XML** **|** **IHE SVS XML**

**Keyword: CardiacUltrasoundAortaFindingSite**

**FHIR Keyword: dicom-cid-12291-CardiacUltrasoundAortaFindingSite**

**Type: Extensible**

**Version: ~~20170914~~yyyymmdd**

**UID: 1.2.840.10008.6.1.871**

**Table CID 12291. Cardiac Ultrasound Aorta Finding Site**

| **Coding Scheme Designator** | **Code Value** | **Code Meaning** | **SNOMED-RT ID** | **UMLS Concept Unique ID** |
| --- | --- | --- | --- | --- |
| **SCT** | **13418002** | **Left Ventricle Outflow Tract** | **T-32650** | **C0225912** |
| **SCT** | **34202007** | **Aortic Valve** | **T-35400** | **C0003501​** |
| SCT | [8128003](http://snomed.info/id/8128003) | Root of Aorta | [T-42110](http://snomed.info/id/8128003) | [C0549113](http://uts.nlm.nih.gov/uts/umls/concept/C0549113) |
| SCT | [81128002](http://snomed.info/id/81128002) | Structure Sinus of Valsalva | [T-42200](http://snomed.info/id/81128002) | [C0037197](http://uts.nlm.nih.gov/uts/umls/concept/C0037197) |
| SCT | [36371001](http://snomed.info/id/36371001) | Left Sinus of Valsalva | [T-42220](http://snomed.info/id/36371001) | [C0226017](http://uts.nlm.nih.gov/uts/umls/concept/C0226017) |
| SCT | [89093001](http://snomed.info/id/89093001) | Right Sinus of Valsalva | [T-42210](http://snomed.info/id/89093001) | [C0226016](http://uts.nlm.nih.gov/uts/umls/concept/C0226016) |
| SCT | [24865005](http://snomed.info/id/24865005) | Non-coronary Sinus | [T-42230](http://snomed.info/id/24865005) | [C0226018](http://uts.nlm.nih.gov/uts/umls/concept/C0226018) |
| SCT | [443167003](http://snomed.info/id/443167003) | Aortic Sinotubular Junction | [T-42102](http://snomed.info/id/443167003) | [C2733424](http://uts.nlm.nih.gov/uts/umls/concept/C2733424) |
| SCT | [54247002](http://snomed.info/id/54247002) | Ascending Aorta | [T-42100](http://snomed.info/id/54247002) | [C0003956](http://uts.nlm.nih.gov/uts/umls/concept/C0003956) |
| SCT | [57034009](http://snomed.info/id/57034009) | Aortic Arch | [T-42300](http://snomed.info/id/57034009) | [C0003489](http://uts.nlm.nih.gov/uts/umls/concept/C0003489) |
| SCT | [88593004](http://snomed.info/id/88593004) | Aortic Isthmus | [T-42310](http://snomed.info/id/88593004) | [C0226019](http://uts.nlm.nih.gov/uts/umls/concept/C0226019) |
| SCT | [7305005](http://snomed.info/id/7305005) | Coarctation of Aorta | [D4-32014](http://snomed.info/id/7305005) | [C0003492](http://uts.nlm.nih.gov/uts/umls/concept/C0003492) |
| **SCT** | **32672002** | **Descending Aorta** |  |  |
| **SCT** | **281130003** | **Descending Thoracic Aorta** |  |  |
| SCT | [113262008](http://snomed.info/id/113262008) | Thoracic Aorta | [T-42070](http://snomed.info/id/113262008) | [C1522460](http://uts.nlm.nih.gov/uts/umls/concept/C1522460) |
| SCT | [7832008](http://snomed.info/id/7832008) | Abdominal Aorta | [T-42500](http://snomed.info/id/7832008) | [C0003484](http://uts.nlm.nih.gov/uts/umls/concept/C0003484) |
| SCT | [1918003](http://snomed.info/id/1918003) | Supra Renal Aorta | [T-42510](http://snomed.info/id/1918003) | [C0226024](http://uts.nlm.nih.gov/uts/umls/concept/C0226024) |
| SCT | [28205006](http://snomed.info/id/28205006) | Infra-Renal Aorta | [T-42520](http://snomed.info/id/28205006) | [C0226025](http://uts.nlm.nih.gov/uts/umls/concept/C0226025) |
| SCT | [12691009](http://snomed.info/id/12691009) | Innominate Artery | [T-46010](http://snomed.info/id/12691009) | [C0006094](http://uts.nlm.nih.gov/uts/umls/concept/C0006094) |
| SCT | [65355003](http://snomed.info/id/65355003) | Right Common Carotid Artery | [T-45110](http://snomed.info/id/65355003) | [C0226086](http://uts.nlm.nih.gov/uts/umls/concept/C0226086) |
| SCT | [29700009](http://snomed.info/id/29700009) | Right Subclavian Artery | [T-46110](http://snomed.info/id/29700009) | [C0226261](http://uts.nlm.nih.gov/uts/umls/concept/C0226261) |
| SCT | [113263003](http://snomed.info/id/113263003) | Left Common Carotid Artery | [T-45120](http://snomed.info/id/113263003) | [C0226087](http://uts.nlm.nih.gov/uts/umls/concept/C0226087) |
| SCT | [85235006](http://snomed.info/id/85235006) | Left Subclavian Artery | [T-46120](http://snomed.info/id/85235006) | [C0226262](http://uts.nlm.nih.gov/uts/umls/concept/C0226262) |

*Modify CID 12304 to add codes* [*https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect\_CID\_12304.html*](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12304.html)

### CID 12304 Echo Measured Property

The Units column contains the proper UCUM representation of the recommended units for the measured property**.**

**Resources:** [**HTML**](http://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12291.html) **|** **FHIR JSON** **|** **FHIR XML** **|** **IHE SVS XML**

**Keyword: EchoMeasuredProperty**

**FHIR Keyword: dicom-cid-12304-EchoMeasuredProperty**

**Type: Extensible**

**Version: ~~20231114~~yyyymmdd**

**UID: 1.2.840.10008.6.1.1145**

**Table CID 12304. Echo Measured Property**

| **Coding Scheme Designator** | **Code Value** | **Code Meaning** | **SNOMED-RT ID** | **UMLS Concept Unique ID** |
| --- | --- | --- | --- | --- |
| **…** |  |  |  |  |
| **SCT** | **82799009** | **Cardiac Output** | **F-32100** | **C0007165** |
| **LN** | **12008-9** | **Pulsatility Index** |  | **C0552113** |
| **LN** | **12023-8** | **Resistivity Index** |  | **C0552128** |
| … |  |  |  |  |

*Modify CID 12305 to add codes* [*https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect\_CID\_12305.html*](https://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12305.html)

### CID 12305 Basic Echo Anatomic Site

**Resources:** [**HTML**](http://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12291.html) **|** **FHIR JSON** **|** **FHIR XML** **|** **IHE SVS XML**

**Keyword: BasicEchoAnatomicSite**

**FHIR Keyword: dicom-cid-12305-BasicEchoAnatomicSite**

**Type: Extensible**

**Version: ~~20210904~~yyyymmdd**

**UID: 1.2.840.10008.6.1.1146**

**Table CID 12305. Basic Echo Anatomic Site**

| **Coding Scheme Designator** | **Code Value** | **Code Meaning** | **SNOMED-RT ID** | **UMLS Concept Unique ID** |
| --- | --- | --- | --- | --- |
| … |  |  |  |  |
| **SCT** | **80891009** | **Heart** | **T-32000** | **C0018787** |
| … |  |  |  |  |
| **SCT** | **27706005** | **Left Pulmonary Vein** | **T-48502** | **C0226670** |
| … |  |  |  |  |
| **SCT** | **91539005** | **Right Pulmonary Vein** | **T-48501** | **C0226669** |
| … |  |  |  |  |
| **SCT** | **48345005** | **Superior Vena Cava** | **T-48610** | **​C0042459​** |
| … |  |  |  |  |

*Add a new CID for Fetal Cardiac Views to Part 16 Annex B:*

*CID 12226. Echocardiography Image View incorporates too much (maternal) anatomy on top of the heart orientation*

*CID 27. Basic Cardiac View contains 3 codes (which are relevant) but our additions are likely not relevant to the existing NM usage of the Basic View*

### CID newcid0 Fetal Echocardiography Image View

**Resources:** [**HTML**](http://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12279.html) **|** **FHIR JSON** **|** **FHIR XML** **|** **IHE SVS XML**

**Keyword: FetalEchocardiographyImageView**

**FHIR Keyword: dicom-cid-newcid1-****FetalEchocardiographyImageView**

**Type: Extensible**

**Version: 20yymmdd**

**UID: 1.2.840.10008.6.1.newcidUID0**

Table CID newcid0. Fetal Echocardiography Image View

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Coding Scheme Designator** | **Code Value** | **Code Meaning**  | **SNOMED-RT ID** | **UMLS Concept Unique ID** |
| SCT | 103340004 | Short Axis | G-A186 | C0522488 |
| SCT | 131185001 | Vertical Long Axis | G-A18A | C1295721 |
| SCT | 131186000 | Horizontal Long Axis | G-A18B | C1295722 |
| DCM | Newcode29 | Four chamber view |  |  |
| DCM | Newcode22 | Aortic arch view |  |  |
| DCM | Newcode23 | Oblique short axis view at ductus arteriosus |  |  |
| DCM | Newcode24 | Short axis view at pulmonary artery level  |  |  |
| DCM | newcode25 | Three vessel view |  |  |
| DCM | Newcode26 | Three vessel and trachea view |  |  |
| DCM | Newcode28 | Left ventricular outflow tract view |  |  |
| SCT | 399195005 | Right ventricular outflow tract view |  |  |

*Add a new CID for Fetal Arrhythmia Measurements to Part 16 Annex B:*

### CID newcid1 Cardiac Ultrasound Fetal Arrhythmia Measurements

**Resources:** [**HTML**](http://dicom.nema.org/medical/dicom/current/output/chtml/part16/sect_CID_12279.html) **|** **FHIR JSON** **|** **FHIR XML** **|** **IHE SVS XML**

**Keyword: CardiacUltrasoundFetalArrhythmiaMeasurements**

**FHIR Keyword: dicom-cid-newcid1-CardiacUltrasoundFetalArrhythmiaMeasurements**

**Type: Extensible**

**Version: 20yymmdd**

**UID: 1.2.840.10008.6.1.newcidUID1**

Table CID newcid1. Cardiac Ultrasound Fetal Arrhythmia Measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Coding Scheme Designator** | **Code Value** | **Code Meaning**  | **SNOMED-RT ID** | **UMLS Concept Unique ID** |
| DCM | newcode05 | Atrial Heart Rate |  |  |
| DCM | newcode06 | Ventricular Heart Rate |  |  |
| DCM | newcode02 | Atrioventricular time interval |  |  |
| DCM | newcode01 | Ventriculoatrial time interval |  |  |

Add the following Definitions to Annex D

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

|  |  |  |  |
| --- | --- | --- | --- |
| Code Value | Code Meaning | Definition | Notes |
| 121026 | Distance | A one dimensional, or linear, numeric measurement **between two points or features**. |  |
| … |  |  |  |
| **newcode01** | **Ventriculoatrial Time**  | **Ventriculoatrial time interval (VA time), defined as the interval between the onset of ventricular systole and the onset of atrial systole.** | **Recommended for assessment of Fetal arrhythmia per Fetal Echo Guideline Japan – Second edition 2021.****Commonly measured by doppler using a view aligned with a pair of locations: the Superior Vena Cava and the Ascending Aorta, or the Left Ventricular Inflow Tract and the Left Ventricular Outflow Tract, or a Pulmonary Artery and Pulmonary Vein. In a coded measurement, when only one finding location is recorded, the partner location is implicit.** |
| **Newcode02** | **Atrioventricular Time** | **Atrioventricular time interval (AV time or AVI), defined as the interval between the onset of atrial systole and the onset of ventricular systole.** | **Commonly measured by doppler using a view aligned with a pair of locations: the Superior Vena Cava (SVC) and the Ascending Aorta, or the Left Ventricular Inflow Tract and the Left Ventricular Outflow Tract, or a Pulmonary Artery and a Pulmonary Vein. In a coded measurement, when only one finding location is recorded, the partner location is implicit.** |
| **Newcode03** | **Left Atrium-Descending Aorta Distance** | **The shortest distance (LD) between any point on the inside of the atrium wall and any point on the outside of the descending thoracic aorta wall measured in a four-chamber view of the heart.**  |  |
| **Newcode04** | **Post-Left Atrium Space Index** | **Post-Left Atrium Space (PLAS) Index is the distance between the left atrium and the descending thoracic aorta divided by the diameter of the descending thoracic aorta, where both measurements are taken in the same view (thus defining the point in the descending thoracic aorta for the diameter measurement).** **Reference:** [**http://jpccs.jp/10.9794/jspccs.32.387/data/index.html**](http://jpccs.jp/10.9794/jspccs.32.387/data/index.html) | **Used in fetal echo for diagnosis of isolated Total Anomalous Pulmonary Venous Connection (TAPVC).** |
| **Newcode05** | **Atrial Heart Rate** | **The number of contraction cycles of the atrium per minute.**  | **This may be determined by observation of the ventricle wall motion.** |
| **Newcode06** | **Ventricular Heart Rate** | **The number of contraction cycles of the ventricle per minute.**  | **This may be determined by observation of the ventricle wall motion.** |
| **newcode09** | **Cerebroplacental ratio** | **The pulsatility index at the middle cerebral artery of the fetus divided by the pulsatility index at the umbilical artery proximal to the fetus.** |  |
| **newcode10** | **Umbilicocerebral ratio** | **The pulsatility index at the umbilical artery proximal to the fetus divided by the pulsatility index at the middle cerebral artery of the fetus.** |  |
| **Newcode11** | **IVC Preload index** | **The ratio of the peak retrograde flow during the A-wave to the peak forward flow during the S-wave, as measured at the inferior vena cava using pulsed-wave doppler.** | **https://pubmed.ncbi.nlm.nih.gov/2130842/ (1990)****https://obgyn.onlinelibrary.wiley.com/doi/full/10.1002/uog.142** |
| **Newcode12** | **IVC S/a** | **The ratio of the peak forward flow during the S-wave to the peak retrograde flow during the A-wave, as measured at the inferior vena cava using pulsed-wave doppler.****This is the inverse of the Preload index.** |  |
| **Newcode21** | **Arterial Duct Arch** | **The ductal arch formed by the ductus arteriosus as it travels from its origin at the pulmonary artery to the point of entry into the descending aorta.** | [**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5030054/pdf/AJUM-16-168.pdf**](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5030054/pdf/AJUM-16-168.pdf) |
| **Newcode22** | **Aortic arch view** | **A planar view of the heart showing the aortic valve, ascending aorta, aortic arch, descending aorta and inferior vena cava.** |  |
| **Newcode23** | **Oblique short axis view at ductus arteriosus** | **A planar oblique short-axis view of the heart showing the pulmonary trunk (main pulmonary artery, right pulmonary artery) and the ductus arteriosus.** |  |
| **Newcode24** | **Short axis view at pulmonary artery level**  | **A planar short-axis view of the heart showing the pulmonary valve, main pulmonary artery, right and left pulmonary arteries.** |  |
| **Newcode25** | **Three vessel view** | **An axial planar view of the heart showing the main pulmonary artery, ascending aorta in cross-section, and superior vena cava (SVC) in cross-section. One or both branch pulmonary arteries may also be included.** | **Sometimes referred to by the abbreviation 3VV.** |
| **Newcode26** | **Three vessel and trachea view** | **An axial planar view of the heart showing the trachea and the aortic and ductal arches converging to form the proximal descending thoracic aorta.** | **Sometimes referred to by the abbreviation 3VT.** |
| **Newcode27** | **Umbilical Artery at Fetus** | **The portion of the umbilical artery that is proximal to the fetus.**  |  |
| **Newcode28** | **Left ventricular outflow tract view** | **An axial planar view of the heart showing the subaortic area, aortic valve, supravalvular region, and ascending aorta.** |  |
| **Newcode29** | **Four chamber view** | **An axial planar view of the heart showing both ventricles and both atria. The view does not necessarily include the apex of the heart.** |  |
| **Newcode30** | **Fetal Cardiovascular Profile** | **Report section for assessment of cardiovascular observations that evaluate fetal well-being**  |  |
| **Newcode31** | **Hydrops Fetalis Score** | **A point-based assessment of abnormal fluid accumulation in fetal body areas. This is a component of the Fetal Cardiovascular Profile Score.** |  |
| **Newcode32** | **Cardiothoracic Size Ratio Score** | **A point-based assessment of heart size relative to thoracic size based on observations of the circumferences or areas. This is a component of the Fetal Cardiovascular Profile Score.** |  |
| **Newcode33** | **Cardiac Function Score** | **A point-based assessment of cardiac function based on observations of valve inflow and regurgitation patterns and ventricular shortening. This is a component of the Fetal Cardiovascular Profile Score.** |  |
| **Newcode34** | **Venous Doppler Score** | **A point-based assessment of venous flow based on Doppler observations of the umbilical vein and ductus venosus. This is a component of the Fetal Cardiovascular Profile Score.** |  |
| **Newcode35** | **Arterial Doppler Score** | **A point-based assessment of arterial flow based on Doppler observations of the umbilical artery. This is a component of the Fetal Cardiovascular Profile Score.** |  |
| **Newcode36** | **Fetal Cardiovascular Profile Score** | **A point-based score (CVPS) that sums the scores of five component assessments of cardiovascular observations to evaluate fetal well-being according to​ Makikallio et al, Human fetal cardiovascular profile score and neonatal outcome in intrauterine growth restriction. Ultrasound Obstet Gynecol 2008; 31: 48‒54** [**https://obgyn.onlinelibrary.wiley.com/doi/10.1002/uog.5210**](https://obgyn.onlinelibrary.wiley.com/doi/10.1002/uog.5210) |  |

*Modify PS3.16 Annex H as shown*

### Table H-1. Code Meanings of LOINC Codes

| **Code Value** | **Code Meaning** |
| --- | --- |
| … |  |
| **12023-8** | **Resistive Index** |
| **12023-8** | **Pourcelot Index** |
| … |  |