

## Linking Epic to NEWT ([www.newbornweight.org](http://www.newbornweight.org))

The publicly available and free to use website, [www.newbornweight.org](http://www.newbornweight.org), which houses the Newborn Weight Tool (NEWT) can now be linked to Epic. NEWT is the first tool created that allows pediatric healthcare providers and parents to see how a newborn's weight during the first days following childbirth compares with a large sample of newborns.

Using a research sample of birth weights from more than 100,000 breastfed newborns, the tool uses a nomogram to plot a baby's weight percentile at any given time in the first few days following birth compared with the research population. The results can be used for early identification of neonates on a trajectory for greater weight loss and related complications.

## Before You Begin

Before starting, please ensure you have:

1. Administrative Access to the following Epic activities:
  - a. Required
    - i. Doc Flowsheet Builder
    - ii. Web Integration (FDI) records
    - iii. Activity (E2N) and Menu (E2U) records
  - b. Likely Required
    - i. SmartForm Designer
    - ii. Extension (LPP) records
2. Information from your Stork/OB clinical teams  
*(You will need to identify where your organization currently documents this data)*
  - a. Birth Time
  - b. Delivery Method (Vaginal vs. Cesarean)
  - c. Feeding Method (Breast, Formula, or Combined)
3. Contact your organization's Connection Hub or team responsible for approving FHIR application downloads.

## Downloading the Application

Search using the NEWT on FHIR application client ID (bb57cdad-5310-4b57-8c8a-c6faee1ba7ab) at [fhir.epic.com/download](http://fhir.epic.com/download). Request download to alert the Connection Hub point person at your organization.

## Map Flowsheet Rows to LOINC and SNOMED Values

LOINC and SNOMED mappings are used in tandem by the NEWT on FHIR integration. LOINC mappings tell NEWT *where* to find the data, and SNOMED mappings tell NEWT *what* the data means. For example, mapping your Delivery Method flowsheet to LOINC 73762-7 tells NEWT where to find delivery method documentation. Mapping the categories in that flowsheet to either of the corresponding SNOMED codes lets NEWT know which values mean Vaginal Delivery, and which mean Cesarean Delivery.

### Required Data Mapping:

NEWT uses **Birth Time, Delivery Method, and Feeding Method** to generate a patient-specific nomogram. LOINC and SNOMED codes are used for retrieval of these data via FHIR APIs. **You must map these codes to values in your Epic system.** We have included instructions below on how to do this mapping but validate that you are mapping to the correct location where these data are collected in your system.

- Birth Time: [LOINC 57715-5](#)
- Delivery Method: [LOINC 73762-7](#)
  - Cesarean Delivery: [SNOMED#200144004](#)
  - Vaginal Delivery: [SNOMED#289259007](#)
- Feeding Method: [LOINC 67704-7](#)
  - Breast Fed: [SNOMED#226789007](#)
  - Formula Fed: [SNOMED#386127005](#)
  - Formula Fed (Donor Milk): [SNOMED#819974004](#)
  - Combined Feeding Method: [SNOMED#733896006](#)

### Requesting Mapping Changes:

These are the default values supported by the NEWT on FHIR integration. If your organization already has these values mapped to other SNOMED/LOINC values, would prefer to use different mappings, or these values become deprecated in the future reach out to [NEWT@pennstatehealth.psu.edu](mailto:NEWT@pennstatehealth.psu.edu) to have the application updated with additional mappings.

## Birth Time – LOINC Mapping

Birth Time is often captured via Stork SmartForms and then stored in an HSB/EPT item. To make this available to NEWT we need to store that data in a flowsheet and map that flowsheet to the appropriate LOINC value. If your organization does not have a flowsheet for birth time, you will need to create one.

In Doc Flowsheet Builder, open your flowsheet and navigate to Concept Mapping. The entire row should be mapped to **LOINC 57715-5**. As this data is not categorical there is no need for SNOMED value mapping.

## Delivery Method - LOINC and SNOMED Mapping

Delivery method is often captured via Stork SmartForms and then stored in an HSB/EPT item. To make this available to NEWT we need to store that data in a flowsheet and map that flowsheet to the appropriate LOINC/SNOMED values. If your organization does not have a flowsheet for delivery method, you will need to create one.

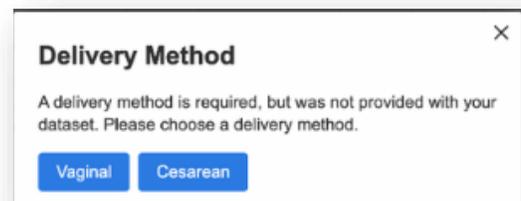
Record Name	Display Name	ID	Type	Version	Status
R OB DELIVERY METHOD	Delivery Method	12124	Data/Category Type	6/4/2013 [2]	Released

Value	Concepts
Vertex, spontaneous	1: VAGINAL DELIVERY [SNOMED#289259007]
Vertex, spontaneous unattended	1: VAGINAL DELIVERY [SNOMED#289259007]
Vertex, outlet vacuum	1: VAGINAL DELIVERY [SNOMED#289259007]
Vertex, low vacuum	1: VAGINAL DELIVERY [SNOMED#289259007]
Vertex, mid vacuum	1: VAGINAL DELIVERY [SNOMED#289259007]
Vertex, outlet forceps	1: VAGINAL DELIVERY [SNOMED#289259007]
Vertex, low forceps	1: VAGINAL DELIVERY [SNOMED#289259007]
Vertex, mid forceps	1: VAGINAL DELIVERY [SNOMED#289259007]
Vertex, high forceps	1: VAGINAL DELIVERY [SNOMED#289259007]
Breech, assisted w/ forceps	1: VAGINAL DELIVERY [SNOMED#289259007]
Breech, assisted w/o forceps	1: VAGINAL DELIVERY [SNOMED#289259007]
Breech, extraction w/ forceps	1: VAGINAL DELIVERY [SNOMED#289259007]
Breech, extraction w/o forceps	1: VAGINAL DELIVERY [SNOMED#289259007]
Low transverse C/S	1: CESAREAN DELIVERY - DELIVERED [SNOMED#200146002]
Low vertical C/S	1: CESAREAN DELIVERY - DELIVERED [SNOMED#200146002]
Classical C/S	1: CESAREAN DELIVERY - DELIVERED [SNOMED#200146002]
Cesarean hysterectomy	1: CESAREAN DELIVERY - DELIVERED [SNOMED#200146002]
Laparotomy for abdominal pregnancy	1: CESAREAN DELIVERY - DELIVERED [SNOMED#200146002]
Forceps and vacuum, Other - specify	1: VAGINAL DELIVERY [SNOMED#289259007]
Vaginal, Spontaneous	1: VAGINAL DELIVERY [SNOMED#289259007]

In Doc Flowsheet Builder, open your flowsheet and navigate to Concept Mapping. The entire row should be mapped to **LOINC 73762-7**. For value concept mapping, your organization's value(s) for cesarean delivery should be mapped to **SNOMED#200144004** and vaginal delivery value(s) mapped to **SNOMED#289259007**.

Unmapped values will require the user to manually specify the Delivery Method when the application launches.



## Feeding Method – LOINC and SNOMED Mapping

Feeding method (breastmilk, donor breastmilk, formula, and combined) documentation will vary across organizations. In this example, we use a custom flowsheet row and map our organization specific values to LOINC and SNOMED codes that NEWT is expecting.

Mapping should be done for both categorical feeding method flowsheet documentation and/or milk volume flowsheet documentation if applicable.

- For **Categorical Feeding Method**, the entire flowsheet row should be mapped to **LOINC 67704-7**, with the categorical values mapped to the corresponding SNOMED code.
- For **Volume-Based Feeding Method** documentation, the entire flowsheet row must be mapped to both **LOINC 67704-7** and the corresponding SNOMED code based on the type of milk volume documented in that row.

### Categorical Feeding Method Example

- Row Concept Mapping: LOINC 67704-7
- Value Concept Mapping
  - Breastfeeding: Breast milk [SNOMED#226789007]
  - Formula – Bottle: FORMULA MILK [SNOMED#386127005]
  - Breast Milk – Bottle: Breast milk [SNOMED#226789007]
  - Exclusive Formula Fed Infant: FORMULA MILK [SNOMED#386127005]

**itor - R ICN DIET TYPE [3040002111]**

Use This Version | Create New Version | Open All | Collapse All

Record Name	Display Name	ID
R ICN DIET TYPE	Diet Type (Neonatal <4mo)	3040002111

**Concept Mapping**

**Row Concept Mapping**

Concepts

LOINC 67704-7 [LOINC#67704-7]

**Value Concept Mapping**

+ Create + Create for All Values

Value	Concepts
Breastfeeding	1: Breast milk [SNOMED#226789007]
Formula - Bottle	1: FORMULA MILK [SNOMED#386127005]
Breast Milk - Bottle	1: Breast milk [SNOMED#226789007]
Exclusive Formula Fed Infant	1: FORMULA MILK [SNOMED#386127005]

### Volume-Based Feeding Method

- Expressed breast milk volume (Breast Fed)
  - Row Concept Mapping: LOINC 67704-7 AND Breast milk [SNOMED#226789007]
- Donor breast milk volume (Formula Fed)
  - Row Concept Mapping: LOINC 67704-7 AND FORMULA MILK [SNOMED#386127005]
- Formula milk flowsheets (Formula Fed)
  - Enfamil (Right Example) Row Concept Mapping: LOINC 67704-7 AND FORMULA MILK [SNOMED#386127005]

**itor - R BOTTLE FEEDING INTAKE (ENFAMIL 20) [3049200016]**

Use This Version | Create New Version | Open All | Collapse All

Record Name	Display Name
R BOTTLE FEEDING INTAKE (ENFAMIL 20)	Enfamil 20 Intake (mL)

**Concept Mapping**

**Row Concept Mapping**

Concepts

FORMULA MILK [SNOMED#386127005]

LOINC 67704-7 [LOINC#67704-7]

**Value Concept Mapping**

+ Create

No value mappings

Use the Create button to add a new value mapping.

For infants with both breast and formula feeding documentation, the application will assume “combined” feeding method.

## Create Extensions to Map HSB Values to Flowsheets

Depending on where these values are being documented at your organization, you may need to connect other data sources to your mapped flowsheet rows. For example, Birth Time and Delivery Method are often documented in SmartForms that file their values to the episode and EPT record. We need to create an after-file extension that saves the value in the SmartForm to a flowsheet row.

### Birth Time & Delivery Method – Extension Mapping

In this example, Birth Time is documented via an RN Newborn Delivery SmartForm. To get data from the SmartForm to file to the flowsheet, we need to create a copy of Epic released LPP 15121 – OB Delivery: File to Flowsheets.

Replace the FLO ID with your organization's flowsheet for Birth Time (in our example, FLO 22687):

Then open the SmartForm where Birth Time is, then open the "data" tab. Here you should be able to enter an after-save extension that runs when data is saved to this field. Enter your new extension:

The screenshot shows the configuration for an extension named "UCSF OB DELIVERY: FILE TO FLOWSHEETS - BIRTH TIME [100242]". The configuration includes the following fields:

- Name:** UCSF OB DELIVERY: FILE TO FLOWSHEETS - BIRTH TIME
- Type:** SmartForm Saving [57000]
- Code:** \$\$fileToFLO\*OBDELPP3(id,vals,"","22687")
- Comments:** Extension records of the type 57000-SmartForm Saving are called when data on SmartForms is saved. This extension is designed to allow the baby's data (such as birth weight) filed from Stork's Delivery Summary to also update a flowsheet row in the baby's chart. When the Delivery Summary is saved, data will file to a reading in the specified flowsheet at the time and date of delivery.
- Code template:** OB DELIVERY BABY FILE TO FLOWSHEET BIRTH WEIGHT [150189]
- Parameters:** A table with the following data:

Name	Value
Patient ID	id
DELIVERY SUMMARY DATA	vals
FLOWSHEET IDENTIFIER	
FLO ID	R UCSF BIRTH TIME [22687] R UCSF BIRTH TIME [22687]

The screenshot shows the SmartForm Designer interface for "UCSF OB RN NEWBORN DELIVERY [243] - DelRecord". The "Data" tab is active, and the "Save" button in the bottom right corner is highlighted with a red box. The "Save" button has a dropdown menu with "UCSF OB DELIVERY" selected.

The same process can be used for Delivery Method, creating another copy of Epic released LPP 15121 – OB Delivery: File to Flowsheets, mapping to your Delivery Method flowsheet, and adding that extension as an after-save extension in the corresponding SmartForm.

## Create your Integration Configuration (FDI)

Now that your data is mapped, create an integration record to display NEWT in your system. Open the Web Integration activity and create and name a new Integration (“NEWT on FHIR Launch”).

### Non-PRD Environments (POC/TST):

**Integration Type:** Smart on FHIR

**URL:** <https://app.newbornweight.org/fhir/test/launch.html>

**Client ID:** 7b21f459-97ba-4cb5-b906-42043a356a11

**Launch Type:** Workspace

**Authentication Method:** Smart on FHIR

### Production Environment:

**Integration Type:** Smart on FHIR

**URL:** <https://app.newbornweight.org/fhir/launch.html>

**Client ID:** bb57cdad-5310-4b57-8c8a-c6faee1ba7ab

**Launch Type:** Workspace

**Authentication Method:** Smart on FHIR

*\*Most organizations will also need to allow-list these URL for their Epic environments\**

## Create your Activity (E2N)

Duplicate the Epic released activity MR\_CLINKB\_ENCOUNTER\_SELECT

**Activity descriptor:** NEWBORN\_WEIGHT\_TOOL

**Menu type:** Item

**Caption:** Newborn Weight Tool

**Tooltip:** Newborn Weight Tool (NEWT)

**Style:** 128

**Form Style:** 2105344

## Create your Menu (E2U)

Create and name a new Menu (E2U) record in Chronicles (i.e. “NEWBORN\_WEIGHT\_TOOL”)

**Menu descriptor:** NEWBORN\_WEIGHT\_TOOL

**Menu type:** Item

**Available to Applications:** DESKTOP

**Caption:** Newborn Weight Tool

**Toolbar Tooltip:** Newborn Weight Tool (NEWT)

**Activity descriptor:** <Your copy of MR\_CLINKB\_ENCOUNTER\_SELECT>

**URL by FDI:** <Your Integration Configuration from Above>

Epic Reference: [Integrating External Web Applications into Epic Setup and Support Guide](#)

*This technical document is provided for informational purposes and is intended to facilitate an understanding of NEWT SMART on FHIR. It is important to note that the information contained in this document is provided by UCSF and is not intended to reflect or establish liability for the actions, decisions, or consequences of any other institution or organization.*