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# **BORN Ontario: BORN Hospital Batch Upload Overview**

**May 12, 2014**

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- Hospital Batch Upload Overview
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# BORN Information System (BIS)

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- Offers a longitudinal view of the mother and child health records from discrete information sources
- Contains data on every birth in the province from hospitals, labs, midwifery practice groups & clinical programs
- Data is collected through a variety of mechanisms including HL7, batch upload, and manual data entry

# BORN Information System (BIS)

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- The BIS uses an encounter model.

An **encounter** (i.e., a healthcare event) represents an interaction of interest involving a patient and the provision of services

- Prenatal Screening
- Antenatal Specialty
- Antenatal General
- Labour
- Birth (Mother & Child)
- Postpartum (Mother & Child)
- NICU



Encounter Examples

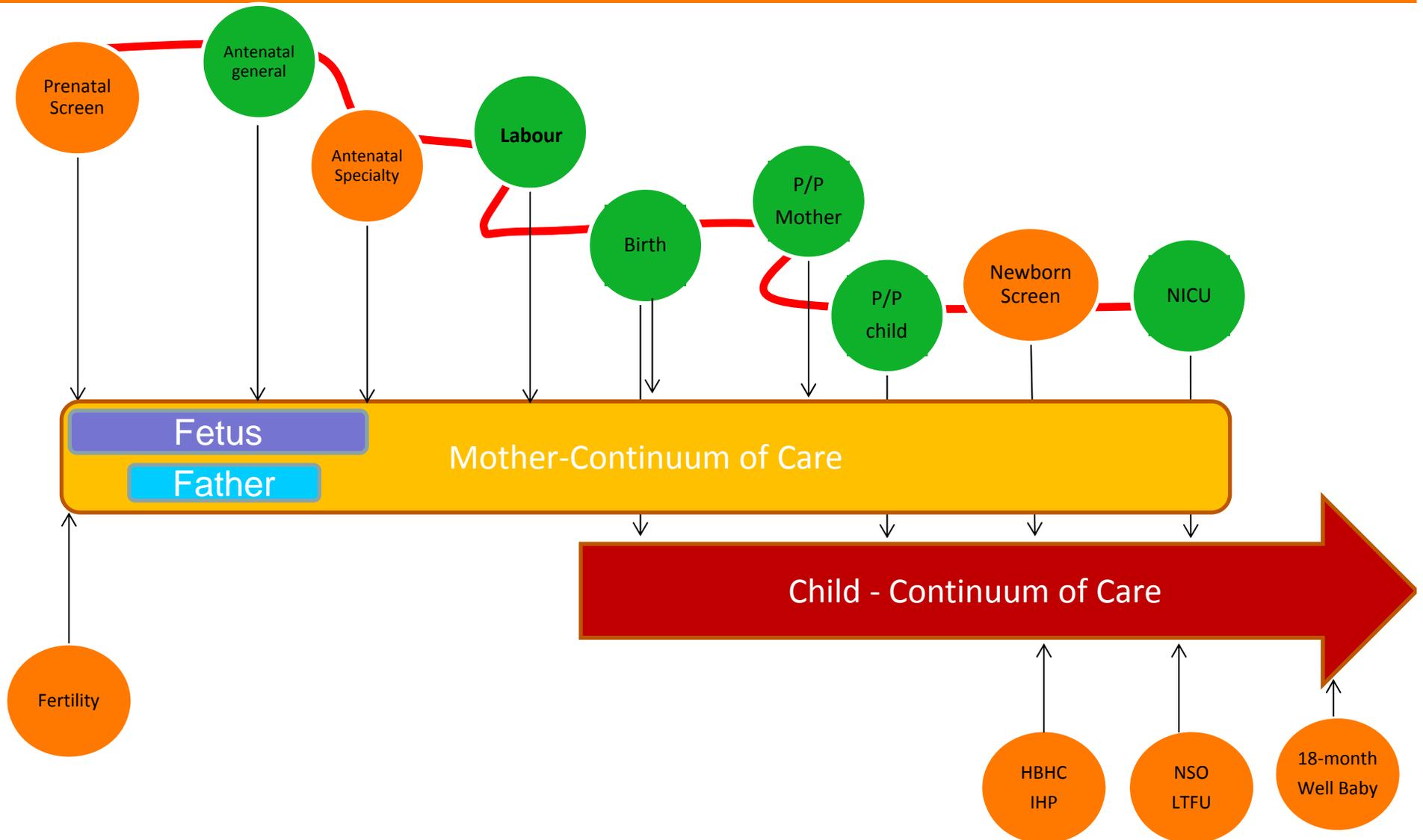
# BORN Information System (BIS)

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- Developed to facilitate the data collection across numerous points of care from multiple program areas across time
- Encounter model → provides flexibility for analyzing data
- Patient-centric focus linking all pregnancies, children, and associated encounters to a single patient record providing the complete view along the continuum

# The Continuum

Encounters that can be created via Hospital Batch Upload



# Methods of BORN Data Entry

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- Manual Data Entry
- Batch Upload
- Hybrid
  - Upload certain encounters (e.g., labour, birth) and manually enter others (e.g., postpartum, NICU)

# Flexible Batch Upload Start Options

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- Sites can transition to using the Batch Upload at any point during the year
  - Cutover can occur after all the production cutover requirements met. Please refer to Hospital Upload Readiness checklist for details
- It is recommended that if a major Hospital upload specification will go into effect close to a site's go-live date that a site works to the new specification

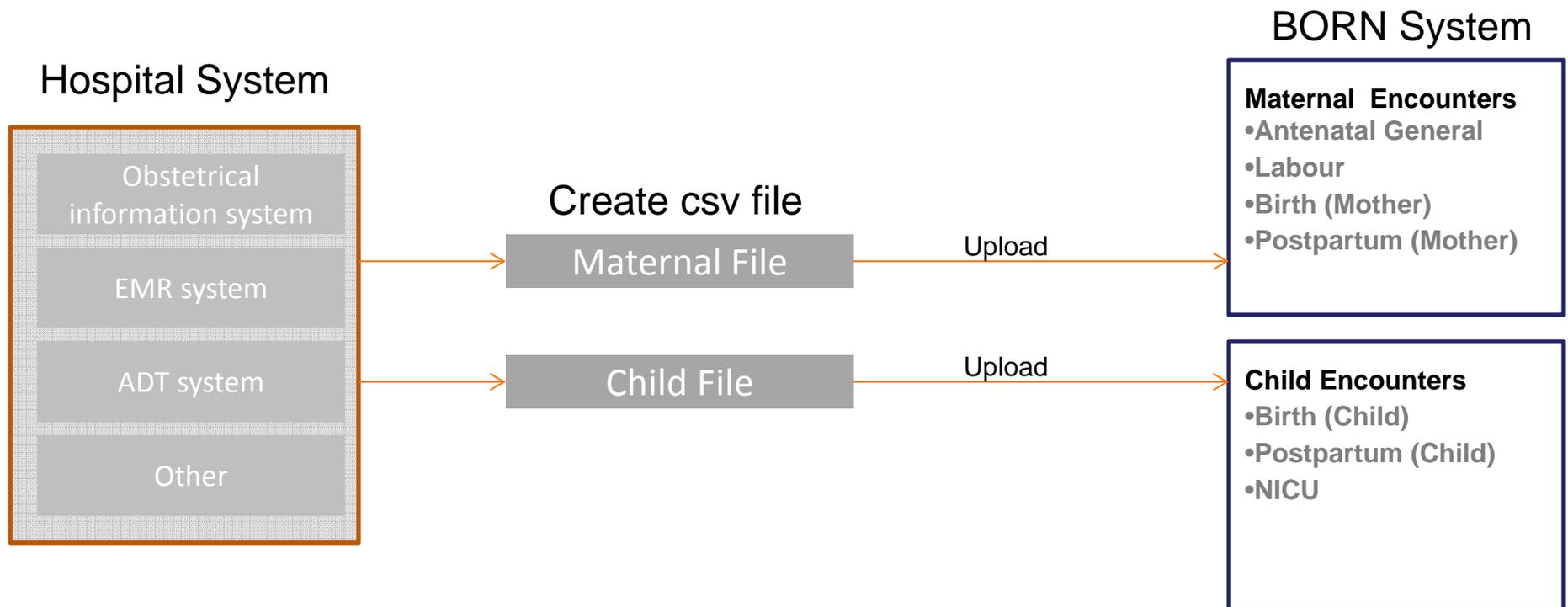
# BORN Information System (BIS)

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- This document will focus on the Hospital Batch Upload process used to capture the Labour, Birth, Postpartum and NICU data



# Upload Process Overview



# Encounter Creation

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- The BORN Hospital Batch Upload supports the ability to create one or multiple encounters depending on the data in the upload record.
- This flexibility enables an organization to submit multiple files, if desired.
  - Supports ability for hospital to submit one child file with their birth and postpartum data and another file with NICU data.
  - Supports ability for some encounters to be created via the upload process and others to be entered manually.

# Encounter Creation

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- Encounters are only created in BORN when an upload record meets the creation criteria applicable for that encounter.
- If the encounter creation rules are not met for a particular record, the encounter will not be created and no error message will occur.



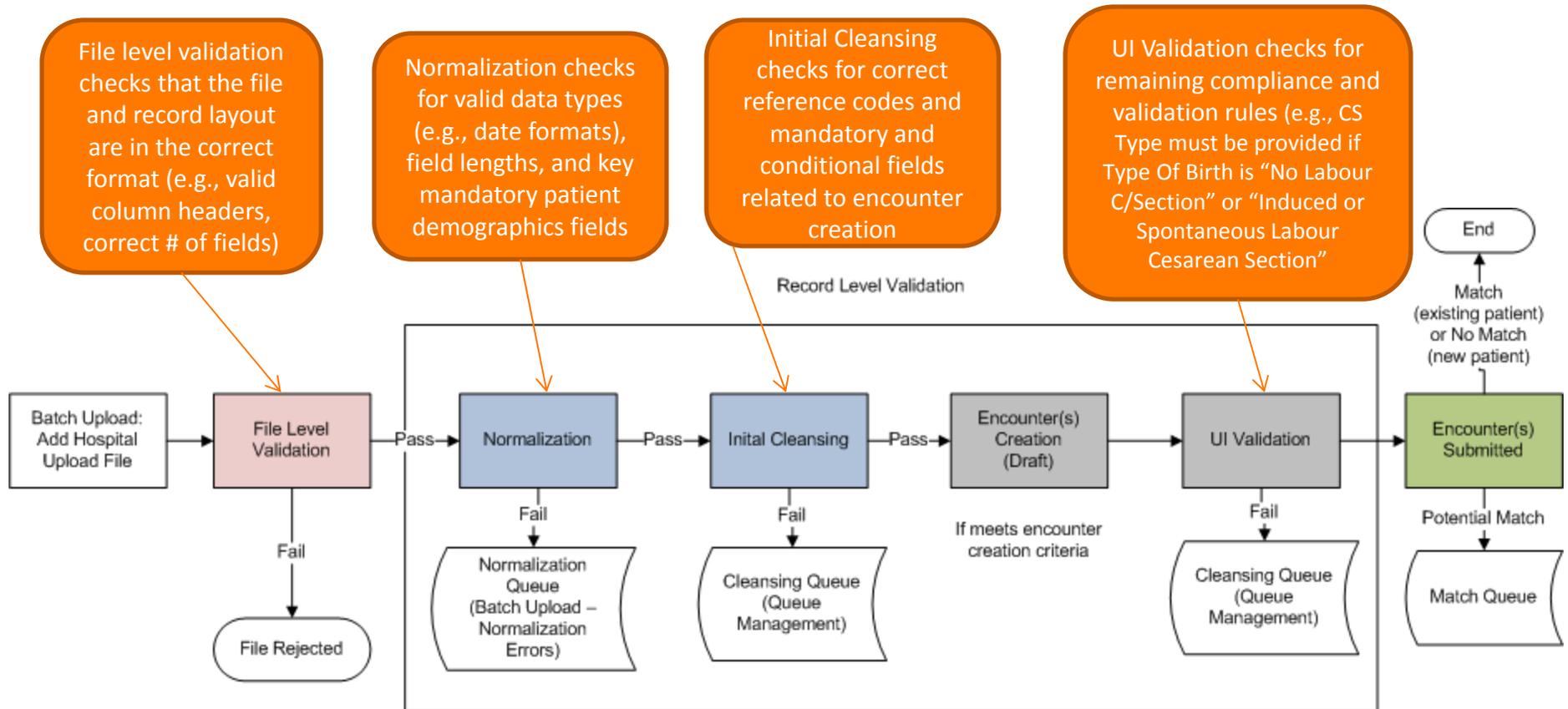
# Encounter Creation: Maternal

Encounter Type	Encounter Definition	Encounter Creation Rules
<b>Labour (L)</b>	A mother's intrapartum experience in hospital or during a planned home birth. Intra-partum hospital care may or not be provided by a Midwife whereas a planned home birth is always attended by a Midwife.	<p>If the following fields are provided</p> <ul style="list-style-type: none"> <li>- Admission Date</li> <li>- Type of Labour (Spontaneous or Induced)</li> </ul>
<b>Birth-Mother (BM)</b>	The mother's experience related to the delivery of the fetus and through to the first hour postpartum. This encounter may be in hospital or a homebirth. A planned home birth is always attended by a midwife whereas a hospital birth may or may not involve midwifery care.	<p>If the following fields are provided</p> <ul style="list-style-type: none"> <li>- Admission Date</li> <li>- Type of Birth</li> </ul>
<b>Postpartum Mother (PPM)</b>	The course of care experienced by a mother after the first hour of delivery to discharge from hospital.	<ul style="list-style-type: none"> <li>- If HBHCScreen is populated and not equal to Unknown then create PPM encounter</li> <li>- Else if PostpartumComplication is populated and not equal to Unknown then create PPM encounter</li> <li>- Else if PostpartumBreastfeedingSupport is populated and not equal to Unknown then create PPM encounter</li> <li>- Else If the time between Maternal Disposition (Transfer, Home, Death) and the Newborn Date and Time of Birth is greater than 2 hours then create PPM encounter</li> </ul>

# Encounter Creation: Child

Encounter Type	Encounter Definition	Encounter Creation Rules
<b>Birth-Child (BC)</b>	The child experience at birth and immediately following. The birth of a fetus may be a live birth or a still birth.	<p>If the following fields are provided</p> <ul style="list-style-type: none"> <li>- Newborn Date Of Birth</li> <li>- Type of birth</li> <li>- Birth Location</li> </ul>
<b>Postpartum Child (PPC)</b>	The course of care for a healthy infant from birth to discharge.	<p>If Phototherapy is populated (Y/N/U).</p> <p>If Phototherapy is NULL, a PPC encounter will not be created.</p> <p>Note: Only phototherapy done in post partum care should be populated in Phototherapy (column 51). If phototherapy occurs in NICU then a code of 'N0042' should populate in *NeonatalTherapiesInterventions (column 78).</p>
<b>NICU</b>	The course of care experienced by a child admitted to a neo-natal intensive care (NICU) or specialized neonatal care (SCN) unit in a hospital.	<p>If the following fields are provided</p> <ul style="list-style-type: none"> <li>- NICU Admit Date</li> </ul>

# Hospital Upload System Flow



# Hospital Batch Upload Specification

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- All required data elements, compliance, and validation rules contained in **Hospital Upload Specification** document
  - <http://www.bornontario.ca/data/born-information-system/hospital-upload-file-specifications>
- Hospital Upload Specification to be released each fall for changes to be supported in **yearly April release**
  - Possible specification changes include:
    - New and/or retired reference codes
    - New and/or retired data elements
    - New, updated, and/or retired compliance/validation rules

# Hospital Batch Upload Specification

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- Specification contains following tabs:
  - File Definitions
    - Describes the general file structure (e.g., file naming convention, delimiters)
  - Field Types
    - Describes the field types that are used in the file layouts and expected formats (e.g., YYYYMMDD for date fields)
  - Encounters
    - Describes the BORN encounters and their creation rules
  - Maternal Layout
    - Layout of the Maternal (HOSPM) record
  - Child Layout
    - Layout of the Maternal (HOSPC) record
  - BORN Reference Codes
    - Lists all applicable BORN reference codes and descriptions

# Upload Specification - File Definitions

The file definitions tab outlines the required file structure of a BORN Hospital Batch Upload file.

BORN File Specification V1.8.1	
Attribute	Description
File Name:	<b>BORN_ORGCODE_FILETYPE_TP_YYYYMMDD_NNN.csv</b>
BORN:	"BORN"
ORGCODE:	Unique value for each submitting organization
FILETYPE:	"HOSPM" for Maternal files "HOSPC" for Child files
TP:	"T" for Test files "P" for Production files
YYYYMMDD:	Creation date of the file
NNN:	- Sequential number - used to uniquely identify files of the same file type created - Files received together will be processed in date/NNN order
Format:	Delimited
Text Qualifier:	Yes, double quotes used as text qualifiers
Includes header row:	Yes - provide Column Names
Row Delimiter:	{CR}{LF}
Column Delimiter:	Comma
Delimited within Multiple Values:	Semicolon

Contact BORN for ORGCODE for your hospital, if not known

Required file naming format for an upload file being sent to BORN

Example:  
BORN\_HOSPABC\_HOSPM\_P\_20130801.001.csv

The file name can include extra text after NNN, if desired.

Example:  
BORN\_HOSPABC\_HOSPM\_P\_20130801\_001\_July2013.csv

# Upload Specification - File Definitions

The File Definitions tab also outlines the header format as well as row, column, and multiple value delimiters.

Format:	Delimited
Text Qualifier:	Yes, double quotes used as text qualifiers
Includes header row:	Yes - provide Column Names
Row Delimiter:	{CR}{LF}
Column Delimiter:	Comma
Delimited within Multiple Values:	Semicolon

Column Position	Column Name	Column Type	Notes
1	HospitalNumber	HospitalID	- Must match hospital pr
2	MaternalHospitalVisitIdentifier	char(25)	
3	MaternalChartNumber	char(25)	
4	HealthCardType	RefCode	
5	MaternalHealthCardNumber	char(25)	- Must be provided if He

```
HospitalNumber,MaternalHospitalVisitIdentifier,MaternalChartNumber,HealthCardType,MaternalHealthCardNumber,Smith,Anna,,,,19780304,,,"1 Main Street",Ottawa,K1F4T1,1269,A123,CH123,NONE,,,"PO 123, RR#1",Cornwall,K8W1
```

Columns are comma-delimited.

Text fields containing commas are surrounded by double quotes.

Fields that contain multiple values (e.g., Multiple Code) are delimited by semi columns.

```
DSEP002;DSEP003;MEP003;MEP004,IP009;IP016,NORESULT,N,N,1
02;DSEP003;MEP003;MEP004,IP009;IP016,NORESULT,N,NONE,N,NONE
DSEP003;MEP003;MEP004,IP009;IP016,NORESULT,N,NONE,NONE
```



# Upload Specification - File Types

The File Types tab defines the required format of the different field types that are used in the record layout tabs.

BORN File Specification V1.8.1		
Field Type	Description	Format
char (x)	Alphanumeric string with a maximum of 'x' characters.	
numeric (x, y)	Numeric string with total length of 'x' containing 'y' decimal places e.g. numeric (4,1) is NNN.N	
Date	YYYYMMDD	numeric (8,0)
Date and Time	YYYYMMDDHHMM (24 hour)	numeric (12,0)
Time	HHMM (24 hour)	numeric (4,0)
HospitalID	Refer to the list of MOH Hospital IDs and Midwife Practice Group (MPG) IDs	numeric (4,0)
RefCode	- Refer to Reference Data tab for the valid codes for each field. - If a value for a RefCode field is not provided and that field has 'Unknown' as a valid value, then BORN will populate the field with 'Unknown' (instead of blank)	char (10)
Multiple Code	- Multiple code values may be provided separated by ';' - Refer to Reference Data tab for the valid codes for each field. - If a value for a MultipleCode field is not provided and that field has 'Unknown' as a valid value, then BORN will populate the field with 'Unknown' (instead of blank)	char (250)
Anomalies List	- Multiple anomalies code values may be provided separated by ';' - Refer to Anomalies List tab for the valid codes for each anomaly	char (250)
PostalCode	Standard Canadian Postal Code format - ANANAN	char (6)
Yes/No	Applicable values are Y - Yes N- No	char (1)
Yes/No/Unknown	Applicable values are Y - Yes N- No U - Unknown	char (1)

- Two field types that have been a challenge at some sites in the past are the Date and Date /Time fields.
- The date format is YYYYMMDD. If date masking or a calendar pick is not implemented on data entry, there is the possibility of month/day transpositions causing potential data quality issues.
  - Errors with the EDB are of particular concern since multiple pregnancies are collected in BORN for a specific patient. Invalid EDBs could result in encounters being associated with an incorrect pregnancy which requires manual clean-up
- The date/time format is YYYYMMDDHHMM and the full date and time must be full entered. A date only value will be rejected in normalization errors.

# Upload Specifications - Encounters

The Encounters tab describes the BORN encounters and their creation rules

BORN File Specification V1.8.1			
File Type	Encounter Type	Encounter Definition	Encounter Creation Rules
Maternal	Antenatal general (AG)	A mother's care experience during her pregnancy when health conditions are indicated as low risk and healthy. An encounter may include pre-registration or clinical assessment where data collection is related primarily to demographics and history and clinical elements related to a pregnancy.	If the following fields are NOT provided - Admission Date - Admission Time - Maternal Disposition Date (Transfer, Home, Death) - Maternal Disposition Time (Transfer, Home, Death)
Maternal	Labour (L)	A mother's intrapartum experience in hospital or during a planned home birth. Intra-partum hospital care may or not be provided by a Midwife whereas a planned home birth is always attended by a Midwife.	If the following fields are provided - Admission Date - Type of Labour (Spontaneous or Induced)
Maternal	Birth-Mother (BM)	The mother's experience related to the delivery of the fetus and through to the first hour postpartum. This encounter may be in hospital or a homebirth. A planned home birth is always attended by a midwife whereas a hospital birth may or may not involve midwifery care.	If the following fields are provided - Admission Date - Type of Birth
Maternal	Postpartum Mother (PPM)	The course of care experienced by a mother after the first hour of delivery to discharge from hospital.	If the time between Maternal Disposition (Transfer, Home, Death) and the Newborn Date of Birth is greater than 2 hours AND the following field is provided
Child	Birth-Child (BC)	The child experience at birth and	If the following fields are provided

Navigation: Index | Change Log | File Definitions | Field Types | **Encounters** | Maternal Layout | Child Layout

The BORN Hospital Batch Upload supports the ability to create one or multiple encounters depending on the data in the upload record

Encounters are only created in BORN when an upload record meets the creation criteria applicable for that encounter

If the encounter creation rules are not met for a particular record, the encounter will not be created and no error message will occur

Special care is required to ensure encounter creation-dependent fields are populated where appropriate



# Upload Specification - Record Layout

The Maternal Layout describes the detailed HOSPM record layout. The Child Layout describes the detailed HOSPC record layout.

Column Posit	Column Name	Column Type	Notes	AG	L	BM	PPM	BORN Code
58	OncologyRadiationTherapyExposure	Yes/No/Unknown	- Must be provided if PreExistingMaternalHealthConditions includes 'Cancer   Diagnosed in Pregnancy' or 'Cancer   Prior to Pregnancy'	C	C	C	X	00015
59	ComplicationsOfPregnancy	Multiple Code	- Must include 'Gestational Diabetes' if any gestational diabetes is provided in 'DiabetesAndPregnancy' - Must include 'Hypertensive Disorders of pregnancy' if HypertensionDisorderInPregnancy does not equal 'None' or 'Unknown' - Must include 'Placental Previa' if 'Maternal - Placenta previa' is provided in AllIndicationsInCS	O	M	M	X	00531
60	DiabetesAndPregnancy	RefCode	- Must include 'Type I', 'Type II' or 'Gestational' if Gestational Diabetes is provided in 'Complications OfPregnancy' - Must include 'Type II   Insulin' or 'Type II   No Insulin' if Type II   Insulin or Type II No Insulin diabetes is selected in Pre-existing Health Conditions	O	M	M	X	00013
61	HypertensionDisorderInPregnancy	RefCode	- Must be 'Preeclampsia' if Maternal - Hypertensive disorders of pregnancy - Preeclampsia' is provided in AllIndicationsForCS - Must be 'Eclampsia' if Maternal -	O	M	M	X	00016

Column names used in header row

Field type for data element

**Compliance criteria:**  
**M: Mandatory** - data must be provided for the field  
**O: Optional** - data does not have to be provided for the field  
**C: Conditional** - the field is mandatory in certain situations  
**X: Field does not apply** to the encounter  
 For example: Complications of Pregnancy is mandatory for labour and birth, optional for antenatal general, and not applicable for postpartum mother



# Upload Specification - Record Layout

Validation rules are documented in the layout tabs under the Notes column

BORN File Specification V1.8.1								
Column Posit	Column Name	Column Type	Notes	AG	L	BIM	PPM	BORN Code
58	OncologyRadiationTherapyExposure	Yes/No/Unknown	- Must be provided if PreExistingMaternalHealthConditions includes 'Cancer   Diagnosed in Pregnancy' or 'Cancer   Prior to Pregnancy'	C	C	C	X	D0015
59	ComplicationsOfPregnancy	Multiple Code	- Must include 'Gestational Diabetes' if any gestational diabetes is provided in 'DiabetesAndPregnancy' - Must include 'Hypertensive Disorders of pregnancy' if HypertensionDisorderInPregnancy does not equal 'None' or 'Unknown' - Must include 'Placental Previa' if 'Maternal - Placenta previa' is provided in AllIndicationsInCS	O	M	M	X	M0531
60	DiabetesAndPregnancy	RefCode	- Must include 'Type I', 'Type II' or 'Gestational' if Gestational Diabetes is provided in 'Complications OfPregnancy' - Must include 'Type II   Insulin' or 'Type II   No Insulin' if Type II   Insulin or Type II No Insulin diabetes is selected in Pre-existing Health Conditions	O	M	M	X	D0013
61	HypertensionDisorderInPregnancy	RefCode	- Must be 'Preeclampsia' if Maternal - Hypertensive disorders of pregnancy - Preeclampsia' is provided in AllIndicationsForCS - Must be 'Eclampsia' if Maternal	O	M	M	X	D0016

For Conditional fields, the notes provides the criteria on when the field must be populated

**Example:**

Complications of Pregnancy is mandatory for labour and birth, optional for antenatal general, and not applicable for postpartum mother

The Notes column also provides other requirements for populating the field (e.g., cross field dependencies)

Any upload records missing required field values or failing validation rules will be rejected by the BORN Hospital Upload.

Errors need to be corrected before a hospital can acknowledge their monthly data.

# Upload Specification - Record Layout

BORN File Specification V1.8.1								
Column Posit	Column Name	Column Type	Notes	AG	L	BIM	PPM	BORN Code
58	OncologyRadiationTherapyExposure	Yes/No/Unknown	- Must be provided if PreExistingMaternalHealthConditions includes 'Cancer   Diagnosed in Pregnancy' or 'Cancer   Prior to Pregnancy'	C	C	C	X	D0015
59	ComplicationsOfPregnancy	Multiple Code	- Must include 'Gestational Diabetes' if any gestational diabetes is provided in 'DiabetesAndPregnancy' - Must include 'Hypertensive Disorders of pregnancy' if HypertensionDisorderInPregnancy does not equal 'None' or 'Unknown' - Must include 'Placental Previa' if 'Maternal - Placenta previa' is provided in AllIndicationsinCS	O	M	M	X	M0531
60	DiabetesAndPregnancy	RefCode	- Must include 'Type I', 'Type II' or 'Gestational' if Gestational Diabetes is provided in 'Complications OfPregnancy' - Must include 'Type II   Insulin' or 'Type II   No Insulin' if Type II   Insulin or Type II   No Insulin diabetes is selected in Pre-exisitng Health Conditions	O	M	M	X	D0013
61	HypertensionDisorderInPregnancy	RefCode	- Must be 'Preeclampsia' if Maternal - Hypertensive disorders of pregnancy - Preeclampsia' is provided in AllIndicationsForCS - Must be 'Eclampsia' if Maternal	O	M	M	X	D0016

Multiple Code and RefCode fields require selection from a list of values.

The list of valid values is found in the BORN Reference Codes tab.

A RefCode field should contain one value. A Multiple Code field can contain one or many values separated by semi colons

# Upload Specification - Reference Codes

The BORN Reference Codes tab lists all applicable BORN reference codes and descriptions

Column Posit*	Column Name	Column Type	Notes	AG	I	BM	PTM	BORN Code
60	DiabetesAndPregnancy	RefCode	- Must include 'Type I', 'Type II' or 'Gestational' if Gestational Diabetes is provided in 'Complications OfPregnancy' - Must include 'Type II   Insulin' or 'Type II   No Insulin' if Type II   Insulin or Type II   No Insulin diabetes is selected in Pre-existing Health Conditions	O	M	M	X	D0013

Maternal Layout

BORN ID column provides cross reference to fields in layout tabs.

The Short Name / Code is the value expected in the upload file.

The BORN Pick List Value is the user-friendly description that is displayed in the BIS pick lists and reports.

**Example:**  
Type I diabetes would be populated with DIAB011 in the upload file for the DiabetesAndPregnancy field

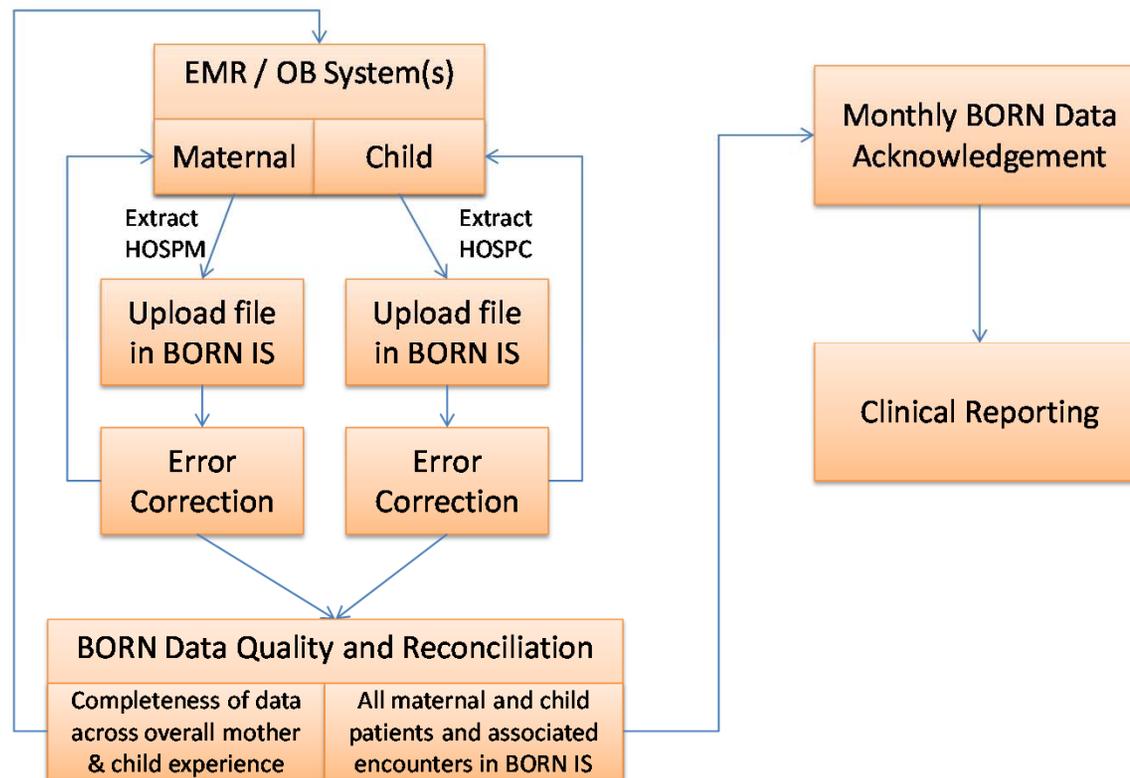
BORN File Specification V1.8.1				
BORN ID	BORN Data Element	Short Name/ Code	BORN Pick List Value	Short Description (maximum 25 characters)
D0013	Diabetes and Pregnancy	NONE	None	None
		DIAB004	Gestational   Insulin	Gestational  Insulin
		DIAB007	Gestational   No Insulin	Gestational  No Insulin
		DIAB011	Type I	Type I
		DIAB012	Type II   Insulin	Type II  Insulin
		DIAB015	Type II   No Insulin	Type II  No Insulin
		UN	Unknown	Unknown

BORN Reference Codes

When new versions of the upload specification are released, all changes are documented in the Change Log tab

# End-to-End Hospital Upload Process

## BORN Hospital Upload Process



# When to Send a Record to the BIS

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- The expectation is that all births and related maternal and child encounters will be captured in the BIS
- The upload data validation assumes that the patient's hospital experience (i.e., encounter) is completed. Required data elements (e.g., transfer/discharge date & time) may be missing if records are sent too early.

# Error Correction Process

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- After an upload file has been processed in the BIS, hospitals will investigate and fix the resulting errors and either:
  1. Correct the data in their **source system** and resubmit in a later extract file.  
★ This is the preferred method to ensure the data in the hospital systems and the BIS are in sync

OR

  2. Manually correct the errors directly in the BORN IS. Note: Any future uploads of the same patient record will overwrite any manual error corrections.
- Note: The BORN batch upload functionality validates the data on an individual encounter basis. An error is only generated if an encounter-specific validation rule is not met.

# Data Quality and Acknowledgement Process

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- After the error correction is completed, hospitals need to validate that the correct number of patients and all the required encounters have been created.
- ***'Incomplete Maternal and Child Record'*** reports validate additional rules between encounters and across maternal and child patients
- ***'Reconciliation'*** reports provide summary counts and listings of maternal and child patient records to help a hospital validate that all births have been entered

# Data Quality and Acknowledgement Process

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- Once a hospital validates that their data is accurate and complete for a particular month, they **acknowledge** the data.
- Once acknowledged, the data will be available to populate clinical comparator reports.



# Data Quality

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- The BIS has numerous Data Quality checks including numerous validation rules that ensure logical and sensible records are created. Examples include:
  - Labour type cannot be “no labour” in a spontaneous vaginal birth
  - Each patient must have a final disposition (e.g., discharged home, transferred to other hospital) in one of their labour, birth, or postpartum encounters
- **It is ESSENTIAL that as many BIS data validations as possible be embedded into data capture systems (EMRs) at the hospital level to reduce impact on resources tasked with BORN error correction**
  - This has proven to be one of the key factors for successful implementation of the BORN Hospital Batch Upload

# How other sites implemented

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- With validation @ source systems
  - External validation engine with error report
  - Excel macro to check csv file
- Without any validation @ source systems
  - Upload daily to find errors and bi-weekly cumulative (upload preview\*)
  - Weekly /bi-weekly upload

# Upload Implications

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- Opportunity to send data from primary source system (EMR) reducing duplicate data entry
- Initial investment to implement data collection, validations rules, and record extraction in source systems with lower on-going support required\*

\* **Note:** If data validation rules cannot be implemented in source systems, increased resource time required for error correction may offset any gains related to reducing the duplicate data entry.

# Stages for Site Transition to Upload

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- Hospital Upload Readiness Evaluation
  - Data source assessment and data mapping
  - Resource assessment
- Site Implementation to Support BORN Extract
  - Solution and impact analysis
  - Screen / Data entry and Extract development
- Upload Production Cutover
  - BORN Test sign-off and Hands-on Training prior to cutover
  - End-to-end testing including reporting, acknowledgement

# Stages for Site Transition to Upload

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- Initial Operations Support
  - Additional dedicated resources needed to monitor and fix any issues found in initial transition period
    - IT resources
      - For example: Modifications to extract/upload to resolve issues, adding validations to eliminate certain data quality scenarios, etc.
    - Clinical informatics support
      - For example: Modifications to data collection screens, addition/modification of data elements to fix common errors, etc.
    - Training resources
      - For example: Creation of required documentation to support processes, education of staff in proper data entry for common errors, etc.
- On-going Operations
  - Resources for on-going processing of upload files
    - For example: Create the upload files from the EMR, upload files to BORN Information System, correct upload errors and data quality errors, and acknowledge data
  - IT / Clinical informatics support on as-needed basis

# Site Implementation

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- Screen Build
  - Workflow analysis
  - BORN elements clarification
  - Implement BORN elements in source system
- Data element mapping
  - Identifying the source system elements to map
  - Setup lookups, references
  - Analyzing source and target systems

# Site Implementation

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- Design and Development
  - Identify the records to be processed
  - Identify triggers for file creation
  - Build the ETL process and csv creation
  - Develop procedure for day to day use
- Testing
  - Working with possible test scenarios – test cases
  - Upload sample files to staging
  - Verify uploaded data

# Upload Production Cutover

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- BIS Training environment available for testing upload files prior to moving to Production
- Ability to test different scenarios. A few examples:
  - Twins, Triplets
  - Stillbirths
  - Mothers transferred in for postpartum care only
  - Babies transferred from L&D to NICU to Postpartum then discharged

# Key Considerations to ask before decision to transition to Batch Upload

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- Are data sources available for all required fields?
- Have the BORN validation rules been implemented?  
If no, what is workaround (e.g., allocated resource time for error correction)?
- How often will uploading occur?
- What is process to ensure all births and associated encounters sent to BIS?
- How will error correction be done and by whom?  
Any roadblocks (e.g., source records close after x days)?

# Questions?

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