

The HiTrack data and patient information management system is designed to help hospitals and state agencies operate more efficient and successful newborn hearing screening programs, including timely and appropriate referral of infants to diagnosis and intervention. HiTrack does this by tracking where infants are in the early hearing detection and intervention process, compiling reports and reminders, and generating letters to parents and physicians who need to be informed about results at various stages.

For these activities to occur, information about the infant's demographic characteristics, contact information, stage in the screening process, screening results, and certain program information such as screener name and hospital must be available in the HiTrack system. Although such information can be entered directly into HiTrack, much of this data may already be available in other sources. For example, leading manufacturers of comprehensive newborn hearing screening equipment have designed their software to collect this information during the screening process. Also, computer-based hospital records often contain demographic and contact information about the baby. By "linking" existing information to the HiTrack software, the data and patient management process is more efficient and accurate for the early hearing detection and intervention program staff.

The purpose of this document is to outline how linkage to HiTrack is best accomplished. The following topics are addressed:

1. The hearing screening process
2. Minimum required data elements to be collected for effective tracking
3. Two data linking formats available to send data to HiTrack
 - a. The HiTrack importing and linking process using the Flat File method
 - b. The HiTrack importing and linking process using the XML method
 - c. File Location, Name and Patient Matching Criteria
4. Maintaining Compatible Pick Lists between HiTrack and the screening equipment data collection software.
5. The recommended process for testing a software link and coordinating ongoing technical assistance to mutual users.
6. Exporting data from HiTrack
7. Registration information

When you are ready to begin working on this linkage, be sure to contact HiTrack linking support at 435-797-3584. The NCHAM Help Desk (ncham.helpdesk@usu.edu) can direct any inquires you may have to an appropriate support contact. Registration information about your product is needed to complete the link. This communication will also help you make sure that you have the most recent version of HiTrack for your testing procedures and so we can assist with your work.

Section #1: Overview of the Hearing Screening Process

The staff at HiTrack have worked with hundreds of hospitals over the past 10 years to implement successful EHDI programs. In doing so, we have learned that there are many different ways hospitals operate newborn hearing screening programs. We have also learned what the staff at most hospitals need to efficiently manage the data generated by such programs. To be appropriate for broad use, data collection and management tools must be able to accommodate the following types of protocols:

- Some hospitals use only OAE-based methods, others use only ABR-based methods, and others use a combination of OAE and ABR.
- Whatever technology or combination of technologies is being used, some hospitals complete the screening prior to hospital discharge, while many others do a “first stage” inpatient screen prior to discharge and a “second stage” outpatient screen after discharge.
- It is common practice for screeners to make multiple attempts to screen the same ear on the same infant, either as an inpatient or an outpatient. The program coordinator is usually only interested in tracking the best result for each ear at each stage, although some would like to save a history of all screening results.
- To pass hearing screening most programs require a bilateral pass. In other words, infants who pass one ear but not the other are usually referred for further screening or diagnostic procedures.
- Depending on the equipment being used, deciding whether the infant passes the screening test is sometimes done automatically by the screening equipment and sometimes by the screener or supervising audiologist. No matter which process is used to make this decision, for each child HiTrack needs:
 - ✓ the result and date of each ear tested (one left and one right)
 - ✓ a label designating the stage of screening (inpatient/outpatient)
- When patients leave the facility without being tested, no-result outcome codes are needed to account for the following situations:
 - Infants discharged prior to screening (Missed)
 - Deceased, Parental Refusal of Screening, Transferred Out

Appropriate dates are required when no-result codes are used.

Because of the variety of protocols used, the data collection software for screening equipment should enable users to:

- maintain a list by name, medical record number and date of birth of all babies who need to be screened (usually this is a listing of all live births).
- track which babies have completed screening, which are “in process,” and which have not been screened.
- provide a procedure for entering/scoring results (either automatically or manually) and identifying and storing at a minimum the “best” result for each ear in a way that is linked to the infant’s identifying information.
- know the date and time each test was done.
- recall and display the actual test results for a given child.
- know whether a particular result was collected at prior to hospital discharge (Inpatient) or after hospital discharge (Outpatient.)
- identify the type of procedure used to generate each result. (TEOAE, DPOAE, OAE or A-ABR)

Section #2: Minimum Required Data Elements

There are 14 required minimum data elements for the screening software to collect and export to HiTrack. These elements are essential for effective tracking of babies after screening. These data elements are the most accessible at the time of screening. Since HiTrack is often installed outside of the nursery, any data that is not exported by the screening software is less available to the program coordinator once the baby is discharged.

Smart hand held screening devices should collect critical data most available at the time of screening. Therefore, in addition to the linking requirements for the screening management software, a column has been provided below that includes essential data fields for the device.

Variable Name	Flat File Field	XML Table and Field	Availability In Screening Management Software	Availability On Device
Infant's last name*	CLAST	Baby.last_name	Required	Required
Infant's first name	CFIRST	Baby.first_name	Required	Required
Infant's date of birth*	CDOB	Baby.birth_datetime	Required	Required
Infant's medical record number*	CMID	Person_Assigned_Medical_ID.IDNumber	Required	Required
Infant's birth facility	HOSP_CODE	Baby.birthing_facility_id	Required	Optional
Infants birth order	MULTI_CODE	Baby.multiple, Baby.birth_order	Required	Optional
Infant's birth weight*	BW_GRAMS	Baby.weight	Required	Optional
Mother's full name	MLAST, MFIRST	Person.last_name Person.first_name (requires a Contact_Role)	Required	Recommended
Code/ID of screening site	SCRN_SITE	Event.facility_id	Required	Optional – Could be auto-filled by software
Code/ID of infant's Primary Care Provider	PE_ID	Contact_Role.contact_id	Required	Optional
Code/ID of Screener conducting test	INITSCRNRO, etc.	Test.screener_id	Required	Required
Stage of test: Inpatient/Outpatient	STAGE	Event.stage_code	Required	Required
Test Result, Date and Time for left and right ears including dates	IRO, ILO or IRA, ILA, RSCRNTIME, LSCRNTIME	Test.result, .Test.test_date	Required	Required
Outcomes and status Dates for un-tested babies.	IRO, ILO	State_History_Record.transition_code, or Tracking_Status_History_Record.to_state	Required	Optional

* matching variable

It is also important to note that a small number of infants may leave the hospital without being screened. These infants also need to be entered into the screening/tracking database because screening programs need a record of all infants who were missed, or of those who did not pass the initial screening in both ears, in order to contact parents and rescreen the infants on an outpatient basis. As discussed earlier, no-result outcome codes and dates should be used to reflect these situations.

Additionally, there are a number of other variables that screening program coordinators often find convenient for screeners to enter at the time screening is performed. See [Table 1](#) at the end of this document for a complete list of variables supported by Flat File exports.

A Primary Key (Globally Unique Identifier) value is required for each Baby and Contact when using the XML File format. See Section 3b for details on additional variables required for XML File exports.

Section #3: The HiTrack importing and linking process

There are two data linking formats available to send data to HiTrack. The benefits and drawbacks to each format are explained below:

	Option A: Flat File	Option B: XML File
Description	A text file where each pair of tests is represented by a full row of sequential comma separated values. Each row of data is delimited by a carriage return.	A text file where values are enclosed by table name and field name delimiters as described in an XSD Schema file. Uniqueness is maintained in each table of data by a Primary Key consisting of a Globally Unique Identifier (GUID).
Compatibility	HiTrack 3.5 Series HiTrack 4 Series	HiTrack 4 Series only
Benefits	<ul style="list-style-type: none"> ✓ Simpler implementation. 	<ul style="list-style-type: none"> ✓ Provides a mechanism for exporting complex relational data to HiTrack without duplication or repeating rows. ✓ Ensures life-span uniqueness of patient and test data by requiring Primary Keys to be defined using Microsoft's Globally Unique Identifier data type (GUID). ✓ Includes Change Date & Time Columns so that advanced overwrite rules can be applied by HiTrack when merging rows. ✓ Microsoft .NET Framework support simplifies data structure creation and export. ✓ All fields are available to export to HiTrack. ✓ Industry standard data exchange format.
Drawbacks	<ul style="list-style-type: none"> ✓ Non-relational. Identifying patient information must be repeated for each new set of tests, contact info or risk indicators. ✓ Only a sub-set of fields are available for import into HiTrack. ✓ Patient and Record uniqueness must be based on a combination of patient variables. This is problematic because identifying variable values may change due to data entry correction. 	More difficult to implement, especially without using the .NET Framework.

Section #3a: Flat File Format

HiTrack imports screening software export data in a comma delimited ASCII format (*.txt). Column headers should not be included. Below are additional specifications for the various file elements, as well as some general formatting rules:

File Element	Format
Character fields	Quote delimited
Date fields	YYYYMMDD
Time fields	HH:MM (24 Hour)
Boolean fields	Y or N
Field separator	Comma
Record separator	Carriage return/linefeed
End of file marker	1A hex or CHR(26) (if not already appended by your tools)

- ✓ Alphanumeric (text) fields **MUST BE** enclosed in double quotation marks (e.g., "some text"). The purpose of having text enclosed in double quotation marks is to prevent HiTrack from confusing a comma(s) included in the text with the commas used to separate the variable fields. Accordingly, if the comma is enclosed in double quotes, HiTrack will ignore the comma, thereby ensuring that it interprets the accurate data for each variable. **Any double quotes within user entered text must be removed.**
- ✓ Date and numeric fields **SHOULD NOT** be enclosed in double quotes.
- ✓ Strictly adhere to the order and number of fields as shown in [Table 1](#) that contains a complete list of variables and their sequence.
- ✓ Records need to be separated with a carriage return/line feed, and an end of file marker needs to be sent.
- ✓ In the instances where data will not be written to a data field, a comma still needs to be included to denote the presence of a field.

Following is an example Flat File contents for the first four fields:

```
"8675309", "Bon"           , "Jack"           , 19991231  
"8877069", "Burroughs"    , "William"       , 19991231
```

Refer to [Table 1](#) at the end of this document for exact column definitions and descriptions for the Flat File format.

Section #3b: XML File Format

The relational database structure for an XML file is contained in an XSD schema file. The following chart is a graphical representation of HiTrack's XSD schema file. Tables typically related to Screening are highlighted in yellow, but data may be exported for any one of the table elements.

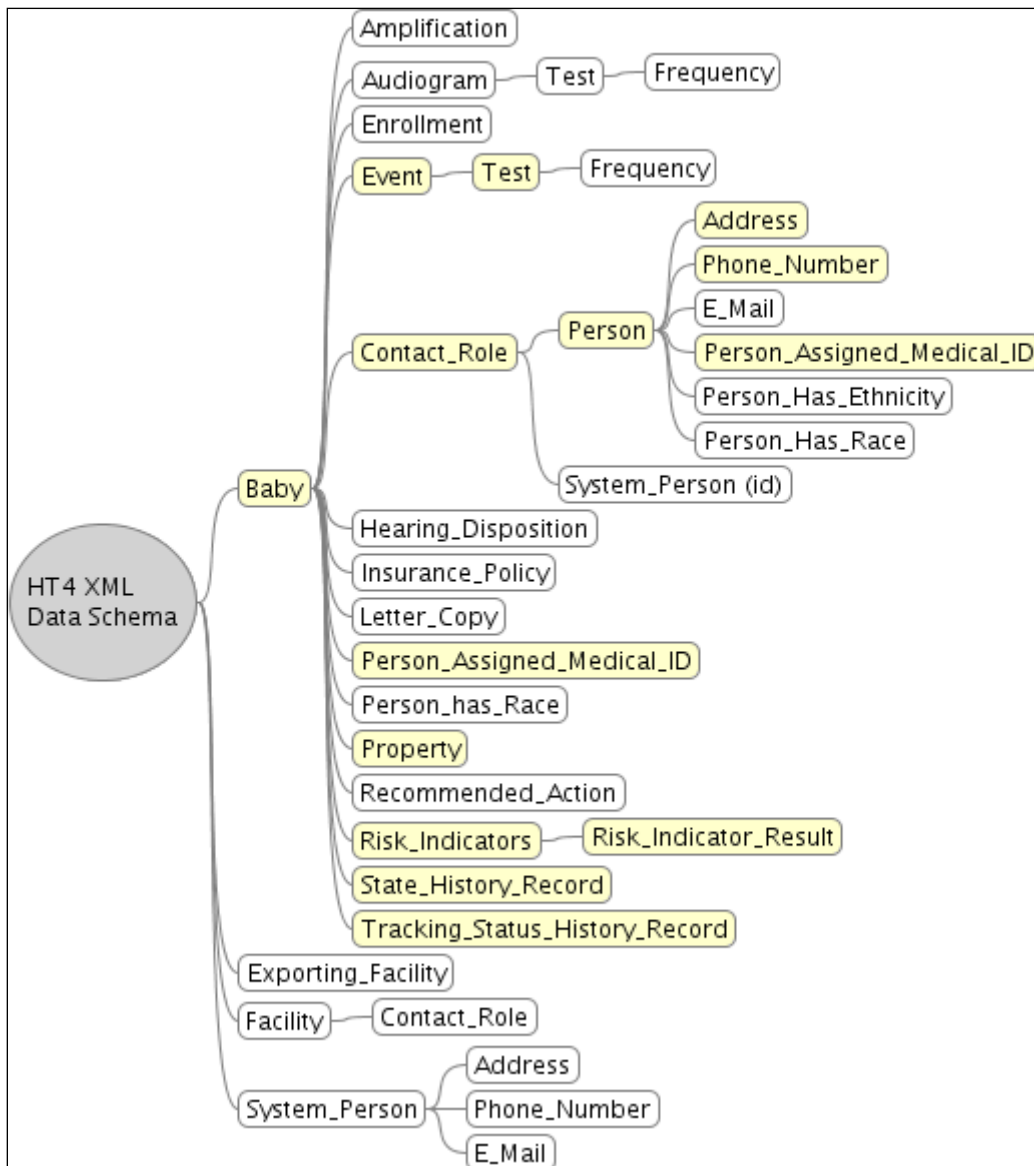


Figure 1

Please refer to the XSD Schema file for column names and information on primary keys and foreign keys.

XML Schema Notes:

- ✓ <Event> rows group a series of <Test>s done at the same stage on the same day.
- ✓ The "Property" table is used for baby Notes.
- ✓ Dates are formatted as "2002-10-10T12:00:00-05:00" (noon on 10 October 2002, Eastern Standard Time in the U.S.)
- ✓ Parents, Contacts and Physicians are associated with baby records using the <Contact Role> table, including what type of contact they are. See [Table 3](#) for Contact Types. In the <Contact Role> table, <For Party Id> is a foreign key to Baby <id> and <Contact ID> is a foreign key to Person <id>.
- ✓ Refer to [Appendix A](#) for the XSD Schema file and an example XML file.
- ✓ More information on XML Schema can be found at the World Wide Web Consortium's XML Schema web page <http://www.w3.org/XML/Schema>

XML Not Tested Outcomes

The relational data model used by the XML File format allows for accurate representation of the complex relationships that exist in patient data including no-result outcomes. For infants without test results "State" and "Tracking" changes must be recorded in the "State History Record" and "Tracking Status History Record" tables.

Use the "State History Record" table to record when babies are "missed" (not tested prior to discharge) or to record babies who skipped screening and referred directly for audiological evaluation, with "M" and "E" as "Transition Code", respectively. This allows further tracking in HiTrack.

Use "Tracking Status History Record" to record when infants are not screened due to Parent Refusal, Demise or when screening is not yet complete because the infant is transferred to a different facility. Use "R", "D" and "T" to represent the change of state to "Refused", "Deceased" and "Transferred Out" respectively.

For Deceased patients, <deceased> should be set to Y in the Baby Table, in addition to filling in the Deceased Date field.

XML Preferred Contact

A Contact Role for "Preferred Contact" should be included for baby contacts when contacts are sent. For example, if the Birth Mother is also the Preferred Contact, two "Contact Role" rows will exist for that baby and that contact, one with a "Birth Mother" type and the other with a "Preferred Contact" type.

XML Schema Required Fields

Some fields are required by the schema because they are Boolean non-null fields. The XSD schema contains the *full* list of required fields. These fields are noteworthy but repeated here for your convenience.

- ✓ <Baby>
 - <birthing_facility_id>
 - <deceased> "Y"/"N"
 - <deleted> "N" (Not used)
 - <parent_screening_consent> "U"
 - <parent_data_sharing_consent> "U"
 - <consent_given_verbally> "U"
 - <visibility> "1"
 - <multiple> "Y"/"N"
- ✓ <Person_Assigned_MedicalID>
 - <person_id> Baby or Person ID
 - <birth_id> (For a baby Med ID this is the same as the person_id)
 - <facility_id>
- ✓ <Contact_Role>
 - <role_start> "Date"
- ✓ <Event>
 - <event_type> "S" = Screening, "D"= Diagnostic
 - <facility_id>
- ✓ <Person> & <System_Person>
 - <deceased> "Y"/"N"
 - <deleted> "N"
 - <visibility> "0"/"1"
- ✓ <Facility>
 - <is_person> "N"
 - <deleted> "N"
 - <visibility> "0"/"1"
- ✓ <Address>
 - <address_type> "D" (domestic)
 - <address_use> "M" (mailing)
- ✓ <Tracking_Status_History_Record>
 - <from_tstatus> "P" (In Progress)
 - <during_state> "I" (Inpatient)

Section #3c: File Location, Name and Patient Matching Criteria

File Location and File Name Standards

HiTrack can read data files from a removable device (i.e. floppy disk, flash drive) or from a pre-specified location on a local hard drive or network drive. Keep in mind, however, that many screening programs have more than one piece of screening equipment, or want to have their database in a different location from their screening equipment. Thus, exporting the database file to a removable device should always be an option.

For Flat File Format, the manufacturer and the HiTrack support team will need to select a mutually-agreeable name for the file less or equal to 8 characters in length ending with a TXT extension. (e.g., "youreqpt.txt")

For XML File Format, the manufacturer and the HiTrack support team will need to select a mutually-agreeable name ending with an XML extension. (e.g., "your_data_file.xml".)

In order to help users keep a record of data files that have been imported, the file is renamed with a time-stamp (e.g. "your_data_file_xml_2007-07-19-12-00-01.old") following the data import procedure.

Exact Matching Criteria – XML merges

After HiTrack imports baby data from an XML file, it will first check whether a baby record already exists in the existing HiTrack data by searching for a match on the unique <id> GUID value. (Matches on <id> are also checked for other tables in the XML Schema.) If no match is found for Baby <id>, then HiTrack will expand its matching approach using the same procedure used in Flat Files (see below).

When exporting additional tests for infants that were previously exported using XML, it is important to reuse the same previously used <id> value for that baby. This allows HiTrack to make exact matches when merging.

Expanded Matching Criteria – Flat File and unmatched records from XML merges

After HiTrack imports baby data from a Flat File, it will search for a matching existing record by checking **infant's medical record number, infant's last name, and infant's date of birth**. If an exact match is found on all three variables, HiTrack will add incoming result data to the matching baby record. If an exact match is not found on any of the three fields, a new baby record will be created.

Partial matches found during both XML and Flat Files are kept in a special "Pending Data" list. A HiTrack user can then investigate and resolve the matching issues at a later time.

Overwrite Rules

For XML Files field overwriting is done based on recency rules using the Change Date from the incoming row compared to the row already existing in HiTrack. Newer field value changes will overwrite rows with older dates. For Flat Files, data rows other than Baby and Contact Demographics are always inserted as new data– there is no overwriting of existing rows.

Section #4: Maintaining Program Information Pick Lists Between HiTrack and the Screening Software

In order to save time and avoid potential confusion caused by different data entry conventions or different spellings of the same name, HiTrack uses “pick lists” (a.k.a. “drop-down menus”) for variables such as facility, type of nursery, physician name, screener name, etc. To maintain data integrity all of the pick lists in the screening software *must* contain the same possible values as those used in HiTrack.

Some HiTrack pick lists, such as those used to document screening outcomes, are static and do not change. Other pick lists are customizable and contain codes and definitions that are established by users to reflect their specific hospital staff and setup. HiTrack allows users to add to these lists to keep their software updated with current screening program participants, including the option to suppress retired entries that need to be retained for data integrity. The customizable pick lists are collectively known as "Program Information".

Another important reason for obtaining the pick lists from HiTrack is because many hospitals report their hearing screening data to state government agencies. At the state level it is important to know where the screening was done, who the physician is and other data described by program information. We recommend that manufacturers include this import feature in their software because the screening equipment software is often the "first stop" for these patient details used to generate letters and to aid in tracking.

Current pick lists can be obtained from HiTrack as a single XML file (HiTrack Version 4 only) or as separate TXT flat files. There are two options for keeping the screening software selections consistent with those in HiTrack:

1. If HiTrack is located on the same computer as the screening equipment, the screening equipment software can read the XML or TXT files directly from
 - Version 4: "C:\PROGRAM FILES\NCHAM\HiTrack 4 for Windows\ProgInfo"
 - Version 3.5: "C:\PROGRAM FILES\NCHAM\HiTrack35\ProgInfo" (XML not available)
2. If the screening equipment software is on a different computer than HiTrack, users can access a HiTrack feature (“Export Program Information”) that exports the customized program information XML and TXT files to removable media. The program information files can then be imported into the screening equipment software.

Flat File Program Information Details:

HOSPITAL.TXT	(names of hospitals where screening is done)
NUR_TYPE.TXT	(type of nurseries, e.g., well-baby, NICU, etc.)
AUDNETID.TXT	(names of audiologists)
SCREENER.TXT	(names of screeners)
PEDNAMES.TXT	(names of physicians)

Note that all of the Flat File Program Information’s text files consist of a "Code" and "Definition" format except PEDNAMES.TXT. This file has separate columns for last name, first name and organization of each physician.

Refer to [Table 5](#) for detailed Pick List format and usage information.

XML Program Information Details:

- ✓ The XML Program Information Schema is the same as the Schema used for patient information.
- ✓ Person entries such as Physicians, Screeners and Audiologists are maintained together in the <System_Person> table and are differentiated by their "System Use Type". (Refer to [Table 4](#) for system use type values)
- ✓ Other Pick List items are shown in the diagram to the right.
- ✓ Each table has a <visibility> column that determines whether or not the user has decided to suppress the person or entry on the user interface. (1=Show, 0=Suppress)

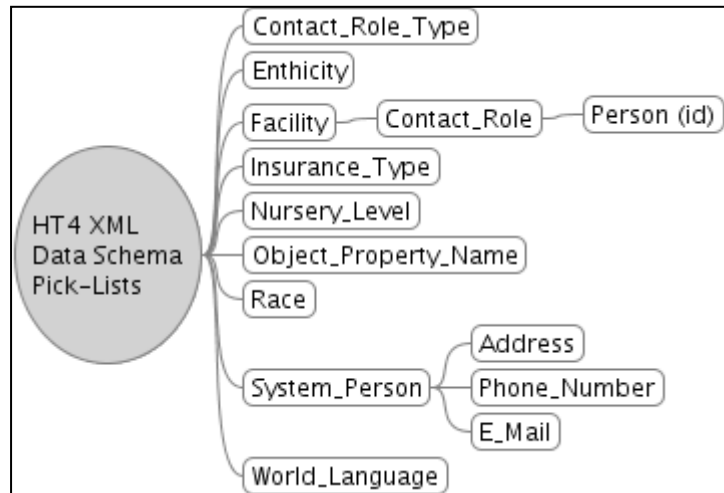


Figure 2: Overview of the HT4 Program Information Schema

Section #5: Testing Software Links and Coordinating Technical Assistance

Even the most carefully planned and programmed software link needs to be rigorously tested so that bugs can be identified and fixed prior to a general software release. Allow at least two months between the completion of major programming work and any projected software release date.

Steps in software assessment include:

1. In-house alpha testing in which our testing staff attempt to break the software link by entering erroneous data in ways that mirror the data entry errors of screeners in real hospital settings. (This assumes that your software has completed a phase of testing within your organization where your own functionality specifications have been assessed.)

This phase also includes cross training of HiTrack and equipment developer staff to provide future technical assistance to mutual users. In long-term planning screening equipment developers will be primarily responsible for providing technical assistance to future users on all aspects of the screening device and HiTrack support staff will answer all technical assistance questions related to HiTrack functions. However, it is our experience that user satisfaction with the link is increased significantly if support personnel on both sides become familiar with the screening software and the HiTrack software. During this phase HiTrack support staff and equipment manufacturers will also ideally work together to prepare documentation on the software link for distribution to end users.

It is extremely helpful if screening equipment and software can be loaned to HiTrack support staff so that we can participate fully in testing the software link and in providing ongoing technical assistance to future mutual users on basic aspects of screening data entry and export.

2. Beta testing in which a small number of hospitals use both the screening equipment and the screening and tracking software on a daily basis. This usually requires about 5-10 hospitals working with the equipment and software over a period of at least 4 weeks.
3. It is expected that equipment manufacturers and the HiTrack support staff will coordinate the date on which the corresponding software packages will be released, since in most cases end users must update both their screening and tracking software in order to use the link.

Section #6: Exporting data from HiTrack

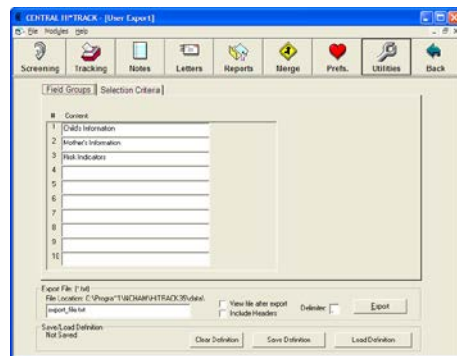
In some cases it may be advantageous to export demographic data from HiTrack to be imported into the screening device software. The device software can then access this pre-populated list of infants to be screened.

This allows users to take advantage of HiTrack's feature rich data entry screens and data validation rules and allows equipment manufacturers to focus their development efforts on the recording and management of the test results.

Typically the export from HiTrack will be done by specifying birth date range criteria. One option for each version of HiTrack is described below. Other export options are available upon request.

Exporting from HiTrack Version 3.5

To create an export file from Version 3.5 the user will first create a "User Defined Export Definition" by going to Utilities→Advanced→Export Data to Flat File. From this screen the top three Field Groups should be selected and birth date Selection Criteria should be entered on the second tab. Informative column information can be obtained by selecting the "Include Headers" option for your export Definition.



The export Definition should be saved for later use. When you click on Save Definition you will be asked to save the Definition file. Use a file name and folder that will be easy to use and remember. This location does not have to be the same location as the export output location.

After a saved Definition is loaded the export file can be created by clicking the "Export" button. Note that this file is not compatible with the "Flat File" format described in this document.

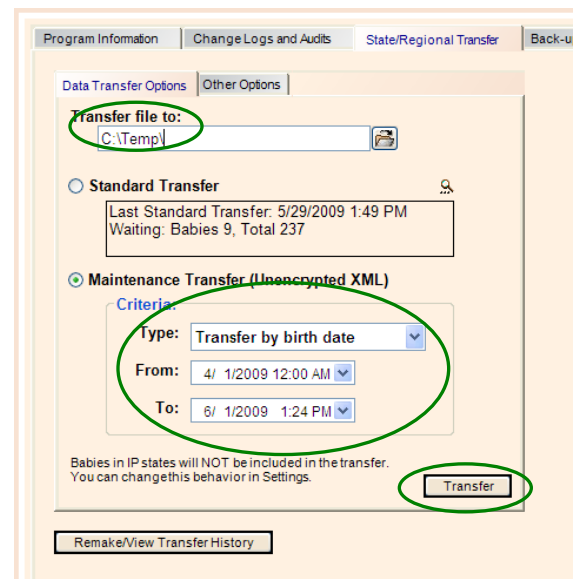
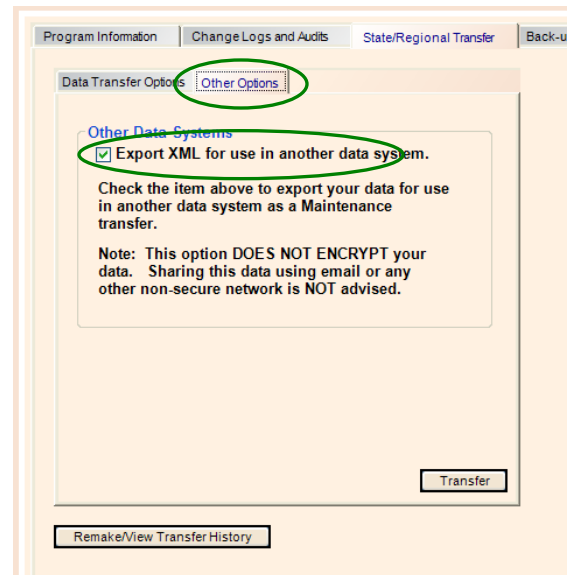
Exporting from HiTrack Version 4

To create an export file from HiTrack 4 go to the Tools→State/Regional Transfer screen. From this screen select "Other Options" tab and fill in the checkbox for "Export XML...". A warning about unencrypted data will be shown and then the tab will return to "Data Transfer Options".

Specify a destination folder for the export file and enter the birth date range criteria.

The export file can be created by clicking the "Transfer" button. An XML file that follows the HiTrack 4 XML Data Schema specification will be created in transfer destination folder.

The exported XML file is named using the Facility name, ID and date of export.



Section #7: Registration with the HiTrack Support team

Configuration settings must be established to allow the HiTrack software to import your data file. Please provide the following information:

1. Which types of tests can be performed? TPOAE, DPOAE, A-ABR, etc?
2. How would you like your equipment to show up in HiTrack? (i.e. what text should we show in a drop-down list or menu?)
3. What mutually-agreeable filename do you plan to export your file as? (filename.txt or filename.xml)

Table 1: Flat File Data Structure for Importing to HiTrack

Required fields in **bold**.

<i>Field Name</i>	<i>Type</i>	<i>Size</i>	<i>Description</i>
CMID	Character	15	Child medical ID
CLAST	Character	20	Child last name
CFIRST	Character	15	Child first name
SEX	Character	1	Child sex (M male; F=female)
CDOB	Date	8	Child date of birth (yyyymmdd)
CTOB	Character	5	Child time of birth (must be on 24-hour clock, hh:mm)
MULTI_CODE	Character	1	Child multiple birth code (S=single birth; multiple, A, B, C etc.)
RACE	Character	2	Child race (See Table 2)
COHORT	Character	2	(Include in data structure, but do not use)
STAGE	Character	1	Inpatient or outpatient status (I=Inpatient; O=Outpatient) If not designated, HiTrack assumes all data was collected on an inpatient basis.
HOSP_CODE	Character	3	Birth hospital code (User-customized pick list. HiTrack has the capability to allow users to automatically assign this variable to all incoming records during the import process if it is not already written to each infant's record by the screening software.)
SCRN_SITE	Character	3	Screening-site code (User-customized pick list. HiTrack has the capability to allow users to automatically assign this variable to all incoming records during the import process if it is not already written to each infant's record by the screening software.)
TYPE	Character	1	Nursery type (See Table 2)
PE_ID	Character	4	Pediatrician's ID (User-customized pick list)
INS_CODE	Character	2	Insurance code (See Table 2)
BW_LOCAL	Numeric	7	(Include in data structure, but do not use)
BW_TYPE	Character	1	(Include in data structure, but do not use)
BW_GRAMS	Numeric	5	Child's birth weight in grams.
SCRN_TYPE	Character	1	Type of screening results (O = TEOAE; D=DPOAE; G = Generic OAE; A = A-ABR. If screening equipment is capable of testing & sending more than one type, separate rows for the infant should be sent.)
IRO	Character	1	Right ear OAE result (See Table 2)
IDRO	Date	8	Right ear OAE test date (yyyymmdd)
IRODTA	Character	12	Screening data test number for right OAE
INITSCRNRO	Character	50	Right ear OAE screener ID
INAUDOAE_R	Character	3	Right ear OAE scoring audiologist ID
ILO	Character	1	Left ear OAE result (See Table 2)
IDLO	Date	8	Left ear OAE test date (yyyymmdd)
ILODTA	Character	12	Screening data test number for left OAE
INITSCRNLO	Character	50	Left ear OAE screener ID
INAUDOAE_L	Character	3	Left ear OAE scoring audiologist ID
IRA	Character	1	Right ear ABR result (See Table 2)

IDRA	Date	8	Right ear ABR test date (yyyymmdd)
IRADTA	Character	12	Screening data test number for right ABR
INITSCRNRA	Character	50	Right ear ABR screener ID
ILA	Character	1	Left ear ABR result (See Table 2)
IDLA	Date	8	Left ear ABR test date (yyyymmdd)
ILADTA	Character	12	Screening data test number for left ABR
INITSCRNLA	Character	50	Left ear ABR screener ID
INSCR_TIME	Numeric	6	(Include in data structure, but do not write to this field)
MLAST	Character	20	Mother last name
MFIRST	Character	15	Mother first name
MMAIDEN	Character	20	Mother maiden name
MIDNUM	Character	15	Mother ID number
MADD	Character	30	Mother first address line
MADD2	Character	30	Mother second address line
MCTY_TOWN	Character	16	Mother city and town
MSTATE	Character	2	Mother state
MZIP	Character	10	Mother zip code
M_PHONE	Character	13	Mother phone number
M_LANG	Character	2	Mother language (See Table 2)
M_BIRTH	Date	8	Mother date of birth (yyyymmdd)
TRKVAR1	Character	1	1st tracking variable
TRKVAR2	Character	1	2nd tracking variable
TRKVAR3	Character	15	Region unique ID number (BRN)
FX	Boolean	1	Risk indicator – family history (blank is allowed for all Risk Indicators)
BW	Boolean	1	Risk indicator – birth weight <1500 grams
ME	Boolean	1	Risk indicator – bacterial meningitis
OD	Boolean	1	Risk indicator – ototoxic medication
HL	Boolean	1	Risk indicator – stigmata, syndrome associated with loss
HY	Boolean	1	Risk indicator – hyperbilirubinemia
CI	Boolean	1	Risk indicator – congenital infection
CF	Boolean	1	Risk indicator – cranio-facial anomalies
MV	Boolean	1	Risk indicator – mechanical ventilation
AP	Boolean	1	Risk indicator – abnormal apgar scores
OTHER	Character	20	Risk indicator – other risk indicators
ALTLAST	Character	20	Alternate contact last name
ALTFIRST	Character	15	Alternate contact first name
ALTADD	Character	30	Alternate contact first address line
ALTADD2	Character	30	Alternate contact second address line
ALT_MCTY	Character	16	Alternate contact city and town
ALT_STATE	Character	2	Alternate contact state
ALT_ZIP	Character	10	Alternate contact zip code
ALT_PHONE	Character	13	Alternate contact phone number

ALT_LANG	Character	2	Alternate contact language
ALT_RELAT	Character	2	Alternate contact relationship to baby. (FC=Father)
NOTES	Character	255	Additional notes
RILLNICU	Boolean	1	Risk indicator – illness or condition req. 48 hours+ to a NICU
RCAREGC	Boolean	1	Risk indicator – care giver concern
RHEADT	Boolean	1	Risk indicator – head trauma
ROMEFF	Boolean	1	Risk indicator – recurrent or otitis media w/ effusion for...3m
RSYNPHL	Boolean	1	Risk indicator – syndromes associated w/Progressive HL...
RNEONATI	Boolean	1	Risk indicator – neonatal ind. specifically hyperb, pers. ph associated w/mv, and cond. req. ECMO
-	Char	5	Reserved
-	Char	50	Reserved
-	Char	4	Reserved
-	Char	1	Reserved
-	Char	1	Reserved
-	Char	8	Reserved
-	Char	1	Reserved
-	Char	1	Reserved
-	Char	1	Reserved
-	Char	1	Reserved
-	Char	1	Reserved
-	Char	11	Reserved
-	Char	11	Reserved
-	Char	19	Reserved
-	Char	19	Reserved
-	Char	5	Reserved
-	Char	5	Reserved
-	Char	5	Reserved
-	Char	5	Reserved
-	Char	5	Reserved
-	Char	5	Reserved
RSCRNTIME	Character	5	Right Ear Time of Screening (must be on 24-hour clock, hh:mm)
LSCRNTIME	Character	5	Left Ear Time of Screening (must be on 24-hour clock, hh:mm)
-			Reserved
-			Reserved
-			Reserved
-			Reserved
-			Reserved
GESTAGE			Child Gestational Age at Birth in Weeks
M_RACE			Mother race (See Table 2)
ETHNICITY			Mother Ethnicity (See Table 5)
EDUCATION			Mother Education (See Table 5)

Table 2: Standard “Pick List” or “Drop-down menu” Code Values

Code	Variable Description
01 02 03 04 05 98 99	RACE (Users can modify or add to this standard list) White African American Hispanic Asian American/Pacific Island American Indian/Alaska Native Other Unknown
1 2 3 4 5	TYPE (Nursery type) (Users can modify or add to this standard list) Well baby Special Care - Level II Special Care - Level III Special Care - Level IV Outpatient (<i>obsolete - do not use</i>)
01 02 03 04 1! 2! 99	INS_CODE (Insurance) (Users can modify or add to this standard list) Uninsured Self Insured Champus Medical Assistance TriCare Medicaid Unknown
1 2 C I	Screening Outcomes Flat File Fields: IRO, ILO, IRA, ILA (Right/Left OAE/ABR screening results columns) XML Field: Test <result> 1 Pass – pass criteria met. 2 Refer – pass criteria not met; referral for further screening or follow-up. C Could Not Test – attempt at screening made, but not completed (generally because the infant was not in a quiet or cooperative state). I Invalid – screening criteria for valid testing were not met.
M R T D S B L X E	Not-Tested Outcomes Flat File Fields: IRO, ILO, IRA, ILA (Right/Left OAE/ABR screening results columns) XML Fields: State_History_record <transition_code>, Tracking_Status_History_Record <to state> M Missed – no screening attempt made on either ear before discharge. (Inpatient screening only) R Refused – parents refused screening. T Transferred – infant transferred to another facility prior to screening. D Deceased – infant expired. S Scheduled – screening appointment has been scheduled. (Outpatient screening only) B Broken Appointment – parent did not return for scheduled appt. (Outpatient screening only) L Locate/lost – attempts to contact the family for follow-up have been unsuccessful but further attempts will be made. (Outpatient screening only) X Follow-up Discontinued – no further attempt will be made to conduct follow-up (i.e., family moved out of state, etc.) E No Scrn->Dx – no outpatient screening was attempted--the infant was referred directly for audiological evaluation. Used most frequently for NICU infants who require audiological evaluation prior to discharge. (Outpatient screening only)

	M_LANG and ALT_LANG (Mother's or Alternate Contact's Language) (Users can modify or add to this standard list)	16	Yiddish
01	English	17	Asian Indian Lang.
02	Spanish	18	Filipino Lang.
03	French	19	Greek
04	Chinese Languages	20	Arabic
05	Italian	21	Serbo-Croatian
06	Portuguese	22	Ukrainian
07	Hmong	23	Polish
08	Mon-Khmer(Cambodian	24	Am Ind./Alaska Native Lang
09	Haitian Creole	25	Farsi
10	Japanese	26	Turkish
11	German	27	Aramaic
12	Vietnamese	28	Romanian
13	Korean	29	Armenian
14	Dutch and Afrikaans	30	Russian
15	Hebrew	31	Thai and Laotian
		32	Hungarian
		99	Unknown

Table 3: XML File Contact Role Types

Preferred Contact (for letters, phone calls, etc.)	{CAAABBBB-FA1C-4398-9230-045D3CE59657}
Birth Mother	{CAAABBBB-FA1C-4398-9230-045D3CE59642}
Father	{CAAABBBB-FA1C-4398-9230-045D3CE59641}
Legal Guardian	{CAAABBBB-FA1C-4398-9230-045D3CE59643}
Primary Care Provider (Physician)	{CAAABBBB-FA1C-4398-9230-045D3CE59645}

Table 4: XML Program Info XML System Use Types

These values will be present in the Program Information XML export in the <System Person>.<system_use_type> column.

Physician	{CCCCCCCC-FA1C-4398-9230-045D3CE59641}
Audiologist (are also considered screeners)	{CCCCCCCC-FA1C-4398-9230-045D3CE59642}
Screeener	{CCCCCCCC-FA1C-4398-9230-045D3CE59648}

**Table 5: Other Codes
Risk Indicators**

These codes should be used in the <Risk_Indicator_Result>.<indicator_id> XML Format column.

FX	Family history	AP	Apgar scores
ILLNICU	NICU > 48 Hours	CAREGC	Parental or caregiver concern
CF	Cranio-facial anomalies...	NEONATI	Neonatal indicators
CI	Congenital (in utero) infection	SYNPHL	Syndromes
BW	Birth weight	HEADT	Head trauma
ME	Bacterial meningitis	OMEFF	Recurrent or persistent
OD	Ototoxic medication...	ND	Neurodegenerative disorders,
HL	Stigmata	NN5L	NICU... (new to 2007)
MV	Mechanical ventilation	CHEM	Chemotherapy (new to 2007)
HY	Hyperbilirubinemia		

Ethnicity Codes

These values should be used in both the <Person_Has_Ethnicity>.<ethnicity_code> column and the ETHNICITY flat file column

Hispanic or Latino	EEEEBBBB-FA1C-4398-9230-045D3CE5ABE0
Not Hispanic or Latino	EEEEBBBB-FA1C-4398-9230-045D3CE5ABE1
Unknown	EEEEBBBB-FA1C-4398-9230-045D3CE5ABE3

Education Level Codes

These values should be used in both the <Person>.<education_level> column and the EDUCATION flat file column

College Graduate or above	eded6464-f022-1e7e-1479-4e91d70dd004
High School Graduate or GED	eded6464-f022-1e7e-1479-4e91d70dd002
Less than High School	eded6464-f022-1e7e-1479-4e91d70dd001
Some College or AA/AS degree	eded6464-f022-1e7e-1479-4e91d70dd003
Unknown	eded6464-f022-1e7e-1479-4e91d70dd005

Table 6 Customizable “Pick List” Flat File structures (Schema.ini entries)

(Obsolete fields are marked in grey)

Pick List	Notes	File & Schema
Birth and Screening Facility List	DEFINITION contains Facility Name.	[hospital.txt] ColNameHeader=False Format=Delimited(,) CharacterSet=ANSI DecimalSymbol=. Col1=CODE Char Width 3 Col2=DEFINITION Char Width 25 <i>Col3=SHOW Char Width 1</i> <i>Col4=ORDER Integer</i> <i>Col5=StateCode Char Width 5</i>
Nursery Types/Levels	DEFINITION contains Type/Level name.	[nur_type.txt] ColNameHeader=False Format=Delimited(,) CharacterSet=ANSI DecimalSymbol=. Col1=CODE Char Width 1 Col2=DEFINITION Char Width 30 <i>Col3=ORDER Integer</i> <i>Col4=SHOW Char Width 1</i>
Audiologist List	DEFINITION contains user formatted audiologist name.	[audnetid.txt] ColNameHeader=False Format=Delimited(,) CharacterSet=ANSI DecimalSymbol=. Col1=CODE Char Width 3 Col2=DEFINITION Char Width 25 <i>Col3=ORDER Integer</i> <i>Col4=SHOW Char Width 1</i> <i>Col5=AUD_SIG Char Width 3</i>
Screeener List	DEFINITION contains user formatted screener name.	[SCREENER.TXT] ColNameHeader=False Format=Delimited(,) CharacterSet=ANSI DecimalSymbol=. Col1=CODE Char Width 3 Col2=DEFINITION Char Width 25 <i>Col3=ORDER Integer</i> <i>Col4=SHOW Char Width 1</i>
Physician List	Physician name separated into PE_LAST, PE_FIRST and PE_ORG. Name concatenation of "First, Last – Organization" is required to uniquely display physicians in your software.	[pednames.txt] ColNameHeader=False Format=Delimited(,) CharacterSet=ANSI DecimalSymbol=. Col1=PE_ID Char Width 4 Col2=PE_LAST Char Width 30 Col3=PE_FIRST Char Width 30 Col4=PE_ORG Char Width 30 Col5=PE_ADD1 Char Width 30 Col6=PE_ADD2 Char Width 30 Col7=PE_CITY Char Width 16 Col8=PE_STATE Char Width 20 Col9=PE_ZIP Char Width 19 Col10=PE_PHONE1 Char Width 19 Col11=PE_PHONE2 Char Width 19 <i>Col12=SHOW Char Width 1</i> <i>Col13=MARKED Integer</i>

Appendix A. Example XML File.

Example XML File contents

```
<?xml version="1.0" standalone="yes"?>
<dsHT4Merge xmlns="http://www.tempuri.org/dsHT4Merge.xsd">
  <Baby>
    <id>8f391c7c-c291-48ec-adc7-997b00b4d6c6</id>
    <nursery_level_code>eeeeeeee-falc-4398-9230-045d3ce59640</nursery_level_code>
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    <parent_screening_consent>N</parent_screening_consent>
    <parent_data_sharing_consent>N</parent_data_sharing_consent>
    <consent_given_verbally>U</consent_given_verbally>
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    <data_entry_complete>Y</data_entry_complete>
    <deceased>N</deceased>
    <last_name>Test</last_name>
    <first_name>Child</first_name>
    <middle_names></middle_names>
    <gender>F</gender>
    <visibility>1</visibility>
    <deleted>N</deleted>
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    <multiple>N</multiple>
    <birth_order>0</birth_order>
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    <baby_ehdi_stage>bbbbbbbb-falc-4398-9230-045d3ce59655</baby_ehdi_stage>
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  </Baby>
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