Advanced Clinical Event Notification (CEN)
Specification

Version 1.10

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Revision History

Version	Date	Author	Comments
1.0	March 6, 2015	Nathan Hardesty-Dyck	Create initial document. Source document: NYeC Subscribe Notify Specifications (DOC-0140 V1.2)
1.1	March 30, 2015	Nathan Hardesty-Dyck	Update with interim notes
1.2	March 31, 2015	Nathan Hardesty-Dyck	Update with new SFTP location
1.3	May 19, 2015	Naitik Patel	Customize for CMC Specs only
1.4	June 18, 2015	Naitik Patel	Added simple rule based subscription and Direct Messaging
1.5	July 13, 2015	Naitik Patel	Added Customized Rule based Subscription, Trigger Events and HL7 Notification
1.6	August 27, 2015	Naitik Patel	Updated Tigger Events
1.7	March 7, 2016	Naitik Patel	Updated Tigger Events
1.8	April 29, 2016	Naitik Patel	Updated Direct Notification
1.9	May 31,2016	Naitik Patel	Updated Tigger Events
1.10	July 6, 2016	Naitik Patel	Added Changes

1 Overview

Healthix supports a Clinical Event Notification (CEN) service that allows clinicians who are affiliated with a Healthix participant to create subscriptions to events affecting their patients, such as admissions to and discharges from any of Healthix's other acute care participants, and to receive descriptions of these events via real-time notifications.

Periodically, the CEN participant supplies Healthix with a subscription file for the patient or implements fully customized rule based subscription on patient demographic/clinical information which will trigger the CEN notification for the patient.

The Healthix H2O CEN service uses the Healthix Clinical Message Center (Current) or HL7 (MDM)(current) or Direct Messaging (4th Quarter of 2016) as delivery methods to send event notification alerts depending on the choice of service participant selected during the implementation of CEN program with Healthix.

The items described in this specification are requirements that must be satisfied before the CEN service can be activated for a participant.

2 Technical Description

Healthix processes the participant's subscription file and creates subscriptions that detect patient-related events at any Healthix participant.

The whole CEN process from setting up subscription to receiving notification can be broken into three major components: Subscription, Trigger and Notification.

For the subscription file, Healthix parses the file to validate its content and configures the relationships that will determine when a notification will be sent back to the participant.

For single rule based subscription, Healthix updates its rule based subscription engine with the one unique rule provided by participant for its patients. This rule can be either on patient demographic or clinical information.

Healthix generates a notification when a patient event is detected in an incoming interface message and a subscription for this patient is found. Healthix then builds and routes the notification to the subscribing participant via the Clinical Message Center (CMC) or Direct Messaging (4th Quarter of 2016).

2.1 Subscriptions

2.1.1 Subscription File
The subscription file is a comma-separated value (csv) format that contains the following information:

- List of patients
- Programs to which a patient belongs (Optional)
- List of clinicians who want to receive CENs for events pertaining to the listed patients (optional)

The subscription file must have a file name extension of `.csv` and should follow the naming convention, `<Facility>_<Date>` (e.g. `NSLIJ_013112.csv`).

The file contents must be comma-separated values, with each row containing the following values:

```
AssigningAuthority,PatientMRN,Program,ClinicianID,ClinicianFirstName,ClinicianLastName
```

Any data after the sixth parameter (`ClinicianLastName`) is ignored and removed during file processing. Do not include quotation marks around any of the parameters.

File Parameters

The following table describes each parameter of the subscription file.

Parameter	Req/Opt	Description	Data Type
AssigningAuthority (Facility Code)	Required	This identifies the facility (e.g., MSMC). The AssigningAuthority is the facility that owns the MRN. Healthix uses the facility code and MRN to identify the patient within Healthix's database. **Note**: At implementation, Healthix will provide the participant with the facility code to be used for their subscriptions. An incoming subscription file that contains assigning authority codes that have not been previously defined will be rejected by Healthix.	String
MRN	Required	This is the assigning authority's Medical Record Number (MRN) that identifies the patient for whom the subscription is created. Healthix uses the facility code and MRN to identify the patient within Healthix's database.	String
Program	Required	The AssigningAuthority name must be prepended to the Program name (e.g. `MSMC_Diabetes`). The code is a string that can include underscores but cannot include blank spaces. There is no limit to the string length. If multiple programs are included in the same subscription file, the file must be sorted by program name. For example, all subscriptions for ProgramA are listed, followed by all subscriptions for ProgramB. Unique patients may have subscriptions in one or more programs.	String
ClinicianID	Required or Optional	A unique identifier at the participant (e.g. the clinician's EMR ID) that identifies the clinician who should receive the notification message. For **Clinical Message Center (CMC)** Notification delivery implementations: • This ID is **required**, as Healthix uses this ID to identify the Healthix CMC user • The ClinicianID is the Healthix clinician number, an ID assigned when creating Healthix user accounts. During implementation, Healthix creates user accounts for clinicians receiving CMC notifications	String
ClinicianFirstName	Optional	If Healthix cannot find the ClinicianID in its registry of users or if the ClinicianID is missing, Healthix uses ClinicianFirstName and ClinicianLastName to look up the appropriate user.	String
ClinicianLastName	Optional	See **ClinicianFirstName**.	String

Note that 180 days after the date that Healthix processes this subscription file, each subscription expires. . If the participant sends Healthix a new subscription file at any point, any previous subscriptions for that participant that are new subscription file are updated and not replaced as the new subscription file is processed.

Example Subscription File – CMC Delivery
The following example subscription file illustrates the use of the parameters described above for CMC delivery of notifications:

Line number	Example CMC Delivery file name: `MSMC_122112.csv`
1	`MSMC,123456,MSMC_Diabetes,testuser1,John,Smith`
2	`MSMC,254367,MSMC_Diabetes,TUser01,John,Smith`
3	`MSMC,254367,MSMC_Diabetes,npatel,Roger,Updike`
4	`MSMC,254367,MSMC_Diabetes,User09,Peter,Vonce`

The example assumes the following:

- John Smith, Roger Updike, and Peter Vonce are clinicians at MSMC
- `Diabetes` is the name of a program at MSMC
- `123456` and `254367` are patient MRNs at MSMC
- `testuser1,TUser01.. Clinician's User ID`

Each line of the example file creates a CEN subscription:

- Line 1 indicates that John Smith receives a notification when the patient with MRN 123456 has an event
- Lines 2, 3, and 4 indicate that John Smith, Roger Updike, and Peter Vonce receive notifications when the patient with MRN 254367
    - When multiple clinicians have a subscription with the same AssigningAuthority, PatientMRN, and Program and when an event occurs for the patient, Healthix generates a notification to each subscribing clinician

Example Subscription File – HL7 Delivery
The following example subscription file illustrates the use of the parameters described above for HL7 delivery of notifications:

Line number	Example HL7 Delivery file name: `MSMC 122112.csv`
1	`MSMC,123456,MSMC_Diabetes,98765,John,Smith`
2	`MSMC,254367,MSMC_Diabetes,98765,John,Smith`
3	`MSMC,254367,MSMC_Diabetes,83646,Roger,Updike`
4	`MSMC,653452,MSMC_Diabetes`
5	`MSMC,653452,MSMC_Geriatric`

The example assumes the following:

- John Smith and Roger Updike are clinicians at MSMC
- `Diabetes` and `Geriatric` are the names of programs at MSMC
- `123456`, `254367`, and `653452` are patient MRNs at MSMC

Each line of the example file creates a CEN subscription:

- Line 1 indicates that Healthix sends an HL7 message referencing John Smith as a recipient when the patient with MRN 123456 has an event
- Lines 2 and 3 indicate that Healthix sends an HL7 message referencing John Smith and Roger Updike as recipients when the patient with MRN 254367 has an event

- When multiple clinicians have a subscription with the same AssigningAuthority, PatientMRN, and Program and when an event occurs for the patient, Healthix generates a single HL7 message that contains the names of all listed subscribing clinicians in the subscription file. That single HL7 message is sent to the participant, and the participant's interface engine routes the notifications to those clinicians contained in the message. This additional routing within the participant's system is beyond the scope of this specification
- Line 4 indicates that Healthix sends an HL7 message containing a reference to a generic user recipient decided upon during project implementation
- Line 5 indicates that Healthix sends an HL7 message referencing the two programs when the patient with MRN 653452 has an event
  - When multiple programs have a subscription with the same AssigningAuthority and PatientMRN, Healthix generates a single HL7 message that contains the names of all listed programs in the subscription file

Subscription File Processing

During implementation, Healthix provides credentials to the participant to enable the participant to access the secure FTP (SFTP) site, used to submit the subscription file. Every business day, Healthix uploads any new subscription file for the participant.

Subscription file upload process:

1. Using an FTP client (e.g. WinSCP), establish a connection to the Healthix FTP site using the SFTP protocol (`sftp:\\`)
   a. The Healthix SFTP host name is `sftp.healthix.org` (Port 22)
   b. Healthix provides each participant with a SFTP account and directory during project implementation
2. When prompted, authenticate using the credentials Healthix assigns during implementation
3. Transfer the subscription file to the directory that opened upon logging into the FTP site
4. Log out of the FTP site

Subscription file processing (Healthix):

Note that processing occurs within Healthix and not all processing steps may be listed here. These steps are included for reference.

1. Healthix updates expiration date of any existing subscriptions during the processing of the new subscription file.
2. Healthix checks each patient MRN in the subscription file against Healthix's patient master patient index (MPI). Healthix logs and reports the patients for which it was unable to determine a match within the Healthix MPI
3. Healthix verifies that the participant has valid patient consent recorded within Healthix's database. Affirmative consent is required for the creation of a CEN subscription. Healthix logs

and reports all MPI-matched patients included in the subscription file and the consent status of each

Reports of the MPI matching and consent status checks are available from Healthix upon request after subscription file processing completes.

2.1.2 Fully Customized Rule Based Subscription

Healthix will work with prospective Participant to fill out rule based subscription form in order to subscribe to their patient in Healthix. Once this form is filled out and approved by prospective participant and Healthix, the rule based subscription will be implemented to create subscription pool for participant. **Fields in Rule Based Subscription Form**
The following table describes the fields in Rule Based Subscription Form:

Field Name	Optional/Required	Description
Participant Name	Required	Name of the organization subscribing CEN rule based subscription via this form
Participant's point of Contact	Required	Point of contact in Organization that Healthix will communicate for Rule Based Subscription
Requestor Name	Required	Name of person requesting rule based subscription
Project Lead	Required	Project Lead on organization side
Subscription Rule	Required	Rule to be implemented for subscription of CEN message. Please define the field or element clearly
Reason for using above rule for subscription	Required	Simple couple of sentence on why the above rule is being used for CEN subscription
Subscription Time Frame	Required	Time period for which this rule will be under effect
Notification Reception Method	Required	Healthix have two ways by which the message will be sent to users of CEN. Please select either one as a mode of reception
List of user receiving CEN message	Required	List of user who wants to get CEN message from Healthix.
Special Request	Optional	Any special request participant have for this rule based subscription

Rule Based
Subscription Form.do

Rule Based Subscription Processing

Healthix provides Rule Based Subscription Form to participant wiling to enroll in Advance Clinical Event Notification program. Participant fills out rule based subscription form and send it to Healthix to implement the rules to trigger CEN messages. Following are some of the criteria Healthix deems useful to create subscription population for CEN. However, Participant is not limited to use this list and will be able to select other criteria as seem fit to create its subscription pool.

1. Patient demographics from the PID segment (Age, DOB, Gender, Zip Code…)
2. Encounter Information (Admission Type, Assigned Ward, Clinic, Attending Doctor…)
3. Diagnosis Codes

4. Problem Lists
5. Procedures
6. Allergies
7. Insurance
8. Observations, Vitals
9. Medications
10. Lab Results
11. …

Rule Based Processing (Healthix):

Healthix takes the Rule Based Subscription form from participant and sets up parameter in the subscription tables with logic provided by Participant via Rule Based Subscription. To follow the earlier example, Healthix will add/create follow:

- Add a table/repository for the criteria
    - Field in the message ((/Container/Patients/Patient/Encounters/Encounter/AssignedWard)
    - Value you want to match (91)
    - The Logical Operator (=)
    - A condition if more than one criteria (and/or)
- Link the new criteria to an enrollment event
    - Add a new Notification Type to the FacilityMessageConfig Table called Enrollment
    - Link the Enrollment Notification Type to Programs, Notification Groups, Facilities and Valid Events in the FacilityProgramConfig table

2.1.3 Persistence of Subscriptions

CEN subscriptions persist after creation according to the following rules:

- By default, all subscriptions expire 90 days after the date on which Healthix processes the subscription file or input rule based subscription.
- Processing of a new subscription file deletes all previous subscriptions for the participant. Each subscription file must contain the complete list of patients to which the participant wishes to subscribe
- Similarly, requesting new rule based subscription will overwrite the previous rule set to trigger CEN. The participant can subscribe to only one rule based subscription at a time.

To maintain patient subscriptions and to keep those subscriptions up-to-date, participants submit subscription files or Rule Based Subscription Form to Healthix on a regular basis. Participants must submit a new subscription file or Rule based subscription form to Healthix at least every 180 days so that subscriptions remain active. Healthix processes new subscription files or rule based subscription form it receives each business day.

2.2 Trigger Events

Once the subscriptions are setup from Subscription file or Rule Based Subscription, Healthix detects several different types of clinical events, which act as a trigger to generate and send CEN to subscribed users.

Healthix listens for trigger events in from inbound HL7v2 and IHE (PIX) interfaces and cross-RHIO notifications. Following are the list of trigger events that Healthix offers in CEN program.

- Emergency department (ED) admission
- ED discharge
- Inpatient admission
- Inpatient discharge
- Patient incarceration; patient release
- Skilled Nursing Facility Admission
- Skilled Nursing Facility Discharged
- Patient Expiration
- Patient enrolled in a CEN program via rule-based subscription method

2.3 Notification Generation and Routing

Once the subscription file is processed, Healthix listens for clinical events relating to the subscribed patients. On receiving trigger event in inbound HL7v2 and IHE (PIX) interfaces and cross-RHIO notifications, Healthix sends notification in form of a Healthix Clinical Message Center (CMC) message or HL7 (MDM) message or Direct Messaging to the clinician identified in subscription process.

1. **Message sent to Healthix CMC**
    a. Healthix sends a notification to the clinician's Healthix CMC inbox
    b. Healthix sends an email "tickler" to the email address associated with the clinician's Healthix user account. The tickler email contains a link to the Healthix CMC inbox
    c. The clinician accesses the CMC inbox directly or via the email tickler and then logs into the CMC
    d. The clinician opens the notification within the CMC inbox. The notification links directly to the patient's record within the Healthix Clinical Viewer

Note that sending notifications to the Healthix CMC requires that the user has an active Healthix user account.

2. **HL7 MDM Message sent to participant**
    a. Healthix sends an MDM message to the agreed-upon destination (e.g. port) at the participant's system
    b. Upon receipt, the participant system takes all responsibility for routing the message to the desired destination

c. If the clinician's ID and/or name was provided in the subscription file, the MDM message will include that information (see Section 4 below)

3. **Direct Messaging**
    a. Healthix sends a Direct Message to one or more Direct addresses provided by the participant.
    b. Healthix will all attachment including CCD directly and securely to clinician.

3 Appendices

3.1 Data Model of HL7 MDM-T02 Notification Message

Note that this section applies only to the HL7 notification delivery option.

3.1.1 MSH Segment Data Fields

Field	Element Name	Req/Opt	Data Type	Notes / Example Data
1	Field Separator	Required	String	|
2	Encoding Characters	Required	String	^~\&
3	Sending Application	Optional	String	Taken from ADT event message, e.g. HEALTHIX_CEN
4	Sending Facility	Optional	String	Taken from ADT event message, e.g. MSMC
5	Receiving Application	Optional	String	Taken from ADT event message, may not be populated
6	Receiving Facility	Optional	String	Taken from ADT event message, may not be populated
7	Message Date/Time	Optional	Timestamp	Taken from ADT event message, YYYYMMDDHHmm
8	Security	Optional	String	Not populated
9	Message Type	Required	String	MDM^T02
10	Message Control ID	Required	Integer	Sequencing ID
11	Processing ID	Optional	Char	May not be populated
12	Version ID	Required	Decimal	HL7 version, usually 2.5+

3.1.2 EVN Segment Data Fields

Field	Element Name	Req/Opt	Data Type	Notes / Example Data
1	Event Type Code	Required	Event Type	T02
2	Recorded Date/Time	Optional	Timestamp	Taken from ADT event message, YYYYMMDDHHmm
3	Date/Time Planned Event	Optional	Timestamp	Taken from ADT event message, may not be populated
4	Event Reason Code	Optional	String	Taken from ADT event message, may not be populated
5	Operator ID	Optional	ID	Taken from ADT event message, may not be populated
6	Event Occurred	Optional	Timestamp	Taken from ADT event message, may not be populated

3.1.3 PID Segment Data Fields

Field	Element Name	Req/Opt	Data Type	Notes / Example Data
1	Set ID – Patient ID	Optional	Sequence ID	Not populated
2	Patient ID (External)	Optional	ID	Not populated
3	Patient ID (Internal)	Required	Composite ID	MRN of originating facility^^^originating facility^MRN
4	Alternate Patient ID	Optional	ID	Not populated
5	Patient Name	Optional	Composite String	Last^First^MRN of originating facility
6	Mother's Maiden Name	Optional	String	Not populated
7	DOB	Required	Integer	YYYYMMDD
8	Sex	Required	Char	M or F
9 - 34	Misc. pt. Demographic Data	Optional	Various	Taken from ADT event message, may not be populated

3.1.4 PV1 Segment Data Fields

Field	Element Name	Req/Opt	Data Type	Notes / Example Data
1	Set ID – PV1	Optional	Sequence ID	Not populated
2	Patient Class	Required	Char	"E" for Emergency, "I" for Inpatient

3.1.5 TXA Segment Data Fields

Field	Element Name	Req/Opt	Data Type	Notes / Example Data
1	Set ID – Document	Optional	Sequence ID	Not populated
2	Visit Type	Required	String	ED for Emergency, IA for Inpatient
3	Event Type	Required	String	"Admit" or "Discharge"
4	Program Name	Optional	String	Name of program, as submitted in subscription file. For multi-program notifications, program names are delimited using a tilde: ProgramName1~ProgramName2~ProgramNameX
5	Subscribing Clinician(s)	Optional	Composite string	ClinicianMRN,firstName,lastName~ClinicianMRN2,firstName2,lastName2~ClinicianMRNX,firstNameX,lastNameX

3.1.6 OBX Segment Data Fields

Field	Element Name	Req/Opt	Data Type	Notes / Example Data
1	Set ID – OBX	Required	Sequence ID	"1"
2	Value Type	Required	String	Indicates data contained in OBX payload, "ST"
3	Observation Identifier	Optional	ID	Not populated
4	Observation Sub-ID	Optional	String	Not populated
5	Observation Value	Required	String	Pt name, MRN, event facility; narrative describing event

Examples of Notifications in HL7 Format

Note that this section applies only to the HL7 notification delivery option.

The following examples are MDM-T02 messages Healthix generates for an emergency department admission and inpatient admission and discharge. In each of the examples, the following data are present:

- The **PID** includes the originating participant's MRN, patient name, date of birth, and sex
- The **EVN** is copied from the ADT message that triggered the notification. This identifies the event type (translated from A01/A03/A04 to T02)
- The **PV1** is copied from the ADT message that triggered the notification. This identifies the patient class (Inpatient or Emergency)
- The **TXA** segment is partially derived from the ADT message that triggered the event. It includes the following:
  - Visit type ("ED" or "IA")
  - Event type ("Admit" or "Discharge")
  - Program name, if provided in the subscription file
  - The subscribing clinician ID(s) and name(s), if provided in the subscription file.
- The **OBX** segment is partially derived from the ADT message that triggered the notification. It contains a human-readable narrative which includes the following:
  - Patient name and MRN, derived from the PID segment of the triggering ADT
  - Facility (translated from a code to facility name)
  - Visit type (translated from Patient Class)
  - Event type (translated from A01/A03/A04)

- o Admit date time and discharge date time would be taken from the PV1 segment of the triggering ADT
- o Additional text could be added to the OBX segment for any customization necessary

3.2 Sample Messages

3.2.1 Example 1: Patient Class E—A04 (Emergency admission)

```
MSH|^~\&|HEALTHIX_CEN|NYPHWEST|HEALTHSHARE|NYPHWEST|20131122093959|^HE
P|MDM^T02|ei13812214567959361195||2.5
EVN|T02|20131122093364||VHF|HEP
PID|||999999^^^NYPHWEST^MRN~999999^SMITH^SHAWN^P^NYPHWEST|1061231668|S
MITH^SHAWN||19500101|F||W~""|123 ST MAIN ST^13^NEW
YORK^NY^10033^^^^MANH|MANH|(555)555-5555||SPA|S|CA|19863484||||H~""
PV1|0001|E|ME4^^^BLATNER^^POM|""|A0XSBN||^^|^^|^^|ME||||HOM|""|
U|^^|E|19863484|SLF||||||||||||||||||""|||M||AC|||20131122093560|""|||||
||
TXA||ED|Admit|NYPHW_HEALTHHOME|||||||999999^SMITH^SHAWN^NYPHWEST^MRN|N
YPHWEST^NYP Columbia^11/22/2013 09:38:08.032602000
OBX|1|ST|||SMITH,SHAWN (NYPHWEST MRN: 999999) was admitted to NYP
Columbia (MRN: 999999), Visit Type: Emergency admission on Nov 22 2013
09:38AM ---- Please login to HIE to view the info.
OBX|2|ST|||NYPHW_HEALTHHOME^
```

3.2.2 Example 2: Patient Class I—A01 (Inpatient admission)

```
MSH|^~\&|HEALTHIX_CEN|NYPHWEST|HEALTHSHARE|NYPHWEST|20131205230520|^ED
S|MDM^T02|ei141206040520409807||2.5
EVN|T02|20131205230444||ADM|EDS
PID|||999999^^^NYPHWEST^MRN~999999^SMITH^SHAWN^P^NYPHWEST|1092478375|S
MITH^SHAWN||19500101|M||B~""|123 W MAINST ST^99^NEW
YORK^NY^10040^^^^MANH|MANH|(555)555-5555||SPA|W|CA|11998017||||H~""
PV1|0001|I|M9GN^^|UR|||HRT999^DOE^JOHN^D^^^^^NYPHWEST|^^|^^|PSY|||I|NY
P||
U|HRT999^DOE^JOHN^D^^^^^NYPHWEST|IN|19108057|SLF||||||||||||||||||||||M||
AC|||20131205230300|||||||||
TXA||IA|Admit|NYPHW_HEALTHHOME|||||||999999^SMITH^SHAWN^NYPHWEST^MRN|N
YPHWEST^NYP Columbia^12/05/2013 23:05:20.46362000
OBX|1|ST|||SMITH,SHAWN (NYPHWEST MRN: 999999) was admitted to NYP
Columbia (MRN: 999999), Visit Type: Inpatient admission on Dec 5 2013
11:03PM ---- Please login to HIE to view the info.
OBX|2|ST|||NYPHW_HEALTHHOME^
```

3.2.3 Example 3: Patient Class I—A03 (Inpatient discharge)

```
MSH|^~\&|HEALTHIX_CEN|NYPHWEST|HEALTHSHARE|NYPHWEST|20131123162057|^BM
V|MDM^T02|ei121001212057694704||2.5
EVN|T02|20131123162025||DSC|BMV
PID|||999999^^^NYPHWEST^MRN~999999^SMITH^SHAWN^P^NYPHWEST|4225241405|S
MITH^SHAWN||19500101|F||W~""|123 ST MAIN ST^13^NEW
YORK^NY^10033^^^^MANH|MANH|(555)555-5555||SPA|S|CA|4708562||||H~""
```

```
PV1|0001|I|M7GS^^||||999M^DOE^JOHN^J^^^^^NYPHWEST|^^|^^|ME||||||
U|999M^DOE^JOHN^J^^^^^NYPHWEST|IN|4708562|L28~~~|||||||||||||||||HOM|""
||M||IA|||20131122150000|20131123120000|||||||
TXA||IA|Discharge|NYPHW_HEALTHHOME|||||||999999^SMITH^SHAWN^NYPHWEST^M
RN|NYPHWEST^NYP Columbia^11/23/2013 14:20:57.03237000
OBX|1|ST|||SMITH,SHAWN (NYPHWEST MRN: 999999) was admitted to NYP
Columbia (MRN: 999999), Visit Type: Inpatient admission on Nov 22 2013
02:01PM -- Patient was Discharged on Nov 23 2013 02:20PM ---- Please
login to HIE to view the info.
OBX|2|ST|||NYPHW_HEALTHHOME^
```