# CSAT Opioid Treatment Data Systems

# D-ATM Software Interface
# Data Definition with HL7 Mapping

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# SW Interface Between

# OTP Clinical Systems and D-ATM

## Introduction

### 1.1 Background

The terrorist attacks on September 11, 2001 had an immediate and profound impact on New York City's opioid treatment system. One opioid treatment program (OTP), in the immediate vicinity of the World Trade Center, was destroyed. Several other OTPs were closed for days or even weeks. In all, it is estimated some 1,000 patients were displaced. Despite the chaos and terror surrounding this tragic event, patients sought treatment and staff and administrators in the New York metropolitan area kept other OTPs open, serving their own as well as these displaced patients. In August, 2005, history seemed to repeat itself as Katrina, the costliest and one of the deadliest hurricanes in United States history, wreaked catastrophic damage in Louisiana, Mississippi, and Alabama. In the days following, 80% of the city of New Orleans was flooded as the levees were breached. All seven New Orleans OTPs were shut down for an extended period of time, and months later, many remain closed. As with 9-11, staff at other programs were forced to make critical dosing decisions, in many cases based upon the information provided by the patients themselves.

Immediately after the events of 9-11, working with a number of key stakeholders from New York, Connecticut, and New Jersey, the Center for Substance Abuse Treatment (CSAT), a component of the Substance Abuse and Mental Health Services Administration (SAMHSA), developed a feasibility and planning study focused on developing a system that would ensure patients could safely and appropriately be dosed in the event that a disaster or other event resulted in closure of one or more treatment sites. In Fall, 2005, SAMHSA/CSAT funded a project to implement a limited pilot of the system, starting in the metropolitan New York area. From the beginning, the project has been guided by four principles: simplicity, affordability, acceptability and confidentiality.

Called D-ATM (Digital Access to Medication), the project entails development and implementation of a pilot system to support the retrieval of limited patient dosage information in the event of both major disasters and also more common disruptions in service due to snow storms, power failures and other localized events. The pilot system uses a biometric device, such as a fingerprint scanner, to store recent dosage information to a centralized database. Should a patient need to seek treatment at a program other than the one where he/she is normally enrolled, the 'guest' OTP will be able to verify that the person is a patient, and then retrieve a report on that patient's medicine order and dosage simply by scanning the patient's fingerprint.

The current project involves development of the necessary infrastructure, followed by a pilot

test of D-ATM with 50 or more OTPs to determine the system's effectiveness in supporting OTPs disaster preparedness and recovery activities for any discontinuity in service. Following the pilot, the system will be reviewed to determine its effectiveness and ability to support a national implementation.

## 1.2 D-ATM Concept of Operations

The purpose of D-ATM is to serve as a disaster response system by providing data for guest OTPs to assist patients who need treatment during service discontinuity of their home OTPs. Such discontinuity could include minor disruptions, not just large-scale disasters such as Hurricane Katrina or the events of September 11, 2001. From the patients' perspective, their personal disaster is the inability to receive medications regardless of the cause of service discontinuity.

A patient who cannot get to his/her 'home' OTP can go to a 'guest' OPT participating in the system. The guest OPT would identify the patient to the system by scanning the patient's fingerprint. D-ATM would them display patient's medicine order and dosing history over the last 90 days. If internet access is unavailable, the guest OTP could still scan the patient's fingerprint to retrieve the patient's D-ATM ID since this information will be stored locally. Then the OTP staff member would dial a toll-free phone number and present his/her identification and the patient's D-ATM ID to a support staff person, who would access D-ATM on behalf of the OTP. The patient's medicine order and dosage information would then be faxed directly from D-ATM to the guest OTP.

For D-ATM to provide the guest OPT with the information necessary for determining the proper dose, the following information must be captured from the patient's home (and guest) OTP:

- Patient's home OPT name and contact;
- Patient's current medicine order;
- Daily dosing events for the past 90 days including dispensing date, dosage amount, and medicine.

The major functional components of D-ATM for the home or guest OTP where the patient is enrolled are:

1. Enrolling the patient – capturing the patient's fingerprint and associating a D-ATM patient ID with the fingerprint 'minutiae';
2. Entering the patient's medicine order by capturing the expiration date, dose amount, if the dose is varied and by how much over what period of time, days for take-home vs. clinic doses, date of patient's next appointment, and other pertinent data;
3. Recording patient's daily dosing events by capturing the dispensing date, dosage amount, whether clinic visit or take home, and any comments;
4. Retrieving patient's medicine order and dosing history from D-ATM;

D-ATM facilitates communication between the OPT treating the same patient. When a guest OPT performs a search for dosing information for a patient, D-ATM alerts the home OTP (except after the patient is enrolled at the guest OTP). More importantly, when a guest OTP

provides a dose to a guest patient, the other OTPs with a current medicine order for this patient will be notified.

D-ATM is being developed to capture the required data two ways:
1. As a stand-alone system;
2. As a back-end system with a software interface (API) with the OTP clinical systems.

With the stand-alone system, the OTP must enter the patient's enrollment, medicine order, and record the patient's dosing events using the D-ATM user interface and application. Since most of this information is already being captured by OTPs in their local clinical systems, it puts a burden on OTP staff to perform duplicate data entry. For this reason, a software interface is planned to facilitate the communication of data between D-ATM and the OTP clinical systems.

# Software Interface

## 1.3 Purpose of SW Interface

Many, if not most, of the OTPs use COTS (commercial off-the-shelf software) to manage the clinic and to track patient dosing information. It is not the intention of D-ATM to compete with these robust software packages and proprietary systems. Nor is it practical to require OTP staff to perform duplicate data entry in their clinical system and in D-ATM. Rather, the strategy is for COTS vendors to build into their software the ability to communicate data to and receive data from D-ATM. This approach eliminates the need for D-ATM to reproduce functionality already included in clinical systems software.

The purpose of this document is to define the transactions and data that must be communicated between D-ATM and the clinical systems. For D-ATM to be successful there must be coordination and cooperation with the major vendors of OTP clinical systems.

## 1.4 D-ATM Information to be Stored in Clinical System

There is some information that the clinical system must store to communicate with D-ATM:
1. The D-ATM patient ID, which is based on the patient's biometric ID (fingerprint);
2. Data elements required by D-ATM (see transactions);
3. An indication of which records in the clinical system were communicated to D-ATM, the date of transfer, and possibly the status of the transfer (e.g., successful update, rejection, error, etc.).

## 1.5 Transport Mechanism

This document is being distributed as a draft to solicit comments and suggestions from the major vendors of OTP clinical software. The method of transport will likely be web services; however, this has yet to be defined.

## 1.6 Health Level 7

Health Level 7 (HL7) is an international messaging format designed to provide a standard for the exchange of data among healthcare computer applications. Adoption of the standard

reduces, considerably, the custom interface programming and program maintenance that might otherwise be necessary. The focus of the HL7 standard is on the definitions of data to be exchanged, the events and messages that are communicated, the timing of the exchanges, and the communication of the application-specific errors between the applications.

HL7 is based on the Reference Information Model (RIM) which is a detailed definition for the information from which the data content of HL7 messages are drawn. The RIM follows object-oriented modeling and diagramming techniques, and is centered on a depiction of the classes that form the basis for the objects in HL7 messages. The RIM consists of Classes, their attributes, relationships, subject areas, and data types.

This SW interface definition, as much as possible, adheres to version 3 of the HL7 model. The data in the various transactions are mapped to their corresponding HL7 class and class attribute.

The following HL7 documents were used to map D-ATM software interface transactions to the HL7 model:

1. HL7 Reference Information Model, ANSI/HL7 V3, 12/17/2003.
2. HL7 Vocabulary Domains.
3. HL7 Data Types – Abstract Specification.

## Interface Transactions

The following transactions have been defined.

### 1.7 Interface Transactions from Clinical System to D-ATM

#### Medicine Order

- Create new medicine order for a patient at an OTP;
- Update existing medicine order;
- Remove medicine order.

#### Completed Dosing Event

- Create completed dosing event for patient at an OTP;
- Remove completed dosing event.

### 1.8 Interface Transactions from D-ATM to Clinical System

**Patient Visit Events Occurring at Other OTPs**

- Dose administered to a patient with a current medicine order at requesting OTP by another OTP;
- Access by another OTP of dosing information for a home patient at the requesting

OTP;

- Retrieval by another OTP of dosing information for a home patient at the

# Data Definition for Interface Transactions

## 1.9 Transactions Communicated from Clinical System to D-ATM

Please refer to the appendix for a brief description of the classes, subclasses, and attributes used. The text in the right hand column of tables for each transaction below was taken from HL7 Reference Information Model, ANSI/HL7 V3, 12/17/2003.

## 1.10 Medicine Order Transactions

Using the API, medicine orders can be created, updated, or removed.

### 1.10.1.1 Create Medicine Order

A patient must be enrolled at the OTP, either as a home or guest patient, before a medicine order can be created at that OTP for that patient.

There can be only one current medicine order for a patient enrollment at an OTP; however, there may be multiple current medicine orders for the patient at different OTPs. If there's a request to create a new medicine order and that patient already has a current medicine order, the current medicine order will be expired and the new medicine order created.

## Create Medicine Order

| Column Name | Column Description | Permitted Values | D-ATM Data Type | Mand-atory | Corresponding HL7 Class/ Subclass and Attribute |
|---|---|---|---|---|---|
| 'CMD' | Command to create a medicine order. | 'C' | | Yes | |
| TTYP | Transaction type for medicine order | 'MO' | | Yes | |
| CLMOID | Clinical system medicine order ID | | | Yes | **Act**.id: **SET**<**II**> **(0..*)** |
| 'DATM PatientId | D-ATM patient ID. A unique ID assigned to each patient when that patient is first enrolled in D-ATM. This ID is associated with the patient's biometric identification, e.g., fingerprint. This ID must be stored in the clinical system since this is the link between the clinical system and D-ATM. | | Integer | Yes | **Role**.id :: **SET**<**II**> **(0..*)** |
| OTPId | The D-ATM ID of the OTP creating, updating, or deleting the medicine order | Valid D-ATM OTP ID | Integer | Yes | **Entity**.id :: **SET**<**II**> **(0..*)** |
| EffectDt | medicine order effective date. The date that the medicine order goes into effect. Note that in D-ATM it is possible to create a medicine order in advance of when it goes into effect. | | Datetime | Yes | **Act**.effectiveTime :: **GTS** **(0..1)** |
| ExpiraDt | medicine order expiration date. The date after which the medicine order is no longer valid. | | Datetime | Yes | **Act**.effectiveTime :: **GTS** **(0..1)** |
| NxtapptDt | next medical appointment date for continuing medicine order. The date of the next appointment related to the patient's medicine order for a controlled substance (e.g., Methadone), and not for other medications. | | Datetime | | **Act**.effectiveTime :: **GTS** **(0..1)** |
| Medicine | Code for Methadone, Buprenorphine, or other controlled substance | [M] Methadone [B] Buprenorphine (add others at needed) | Varchar(1) | Yes | **Entity**.id :: **SET**<**II**> **(0..*)** |
| DoseType | Code for single or split dose. | [SI] Single dose [SP] Split dose | Varchar(2) | Yes | |
| DoseAmt | If the dose is varied, this is the starting dosage amount. If dose isn't varied, then this is the daily dose amount. The amount in milligrams of a daily dose of the controlled | | Integer | Yes | **SubstanceAdministration**.doseQuantity :: **IVL**<**PQ**> **(0..1)** |

| Column Name | Column Description | Permitted Values | D-ATM Data Type | Mand-atory | Corresponding HL7 Class/ Subclass and Attribute |
|---|---|---|---|---|---|
| | substance. | | | | |
| VaryDoseAmt | If the dose is to be varied, this is the positive or negative number of milligrams to increase or decrease the starting dose amount in a patient's medicine order. If no sign, then a positive number is assumed. | | Integer | | |
| VaryPeriodNum | If the dose is to be varied, then this is the number of time period units (e.g., weeks, doses) over which the dose amount is to be varied by the specified amount | | Integer | | |
| VaryeriodUnit | If the dose is to be varied, then this is the time period unit (e.g., day, week, dose) over which the dose amount is to be varied by the specified amount | [D] Day<br>[W] Week<br>[S] Dose. | Varchar(1) | | |
| Reason | The reason for the Patient's medicine order dose amount. | | varchar(1000) | | |
| TakehomeNum | The approved number of take home doses that a patient may receive in a given time period (e.g., week, medicine order). | | Integer | | **Entity**.quantity :: **SET**<**PQ**> **(0..*)** |
| TakehomePeriodUnit | The unit of time for which the number of take home doses (TakehomeNum) is approved (e.g., 'per week' or 'per medicine order'). | [W] Per Week<br>[O] Per Medicine Order | Varchar(1) | | |
| Comment | Medicine Order Notes/Comment. | | Varchar(3000) | | **Act**.text :: **ED** **(0..1)** |
| MonVisitType | If Monday's dose is given at a clinic visit or is a take home. | ['C'] Clinic<br>['H'] Take Home | Varchar(1) | | |
| TueVisitType ['C', 'H'] | If Tuesday's dose is given at a clinic visit or is a take home. | ['C'] Clinic<br>['H'] Take Home | Varchar(1) | | |
| WedVisitType ['C', 'H'], | If Wednesday's dose is given at a clinic visit or is a take home. | ['C'] Clinic<br>['H'] Take Home | Varchar(1) | | |
| ThuVisitType ['C', 'H'], | If Thursday's dose is given at a clinic visit or is a take home. | ['C'] Clinic<br>['H'] Take Home | Varchar(1) | | |
| FriVisitType ['C', 'H'], | If Friday's dose is given at a clinic visit or is a take home. | ['C'] Clinic<br>['H'] Take Home | Varchar(1) | | |
| SatVisitType ['C', 'H'], | If Saturday's dose is given at a clinic visit or is a take home. | ['C'] Clinic<br>['H'] Take Home | Varchar(1) | | |
| SunVisitType ['C', 'H'], * | If Sunday's dose is given at a clinic visit or is a take home. | ['C'] Clinic<br>['H'] Take Home | Varchar(1) | | |

#### 1.10.1.2 Update Medicine Order

When a medicine order is updated, the sending OTP can send only those date elements that were changed or all of the data elements whether or not they changed. If the original medicine order has a value in a particular field, say comment, and the medicine order update has no value in comment, then the original comment will be blanked out. In other words, nothing will overwrite something.

The only fields of a medicine order that can be updated are the expiration date, next appointment date, and comments, and only if the medicine order is current. All other updates will result in the system copying the information in the medicine order to be updated to a new medicine order and the updates applied to the new medicine order. If the original medicine order to be updated was current, then it will be expired.

If there's a request to update a medicine order that doesn't exist, the medicine order will be created.

## Update Medicine Order

| Column Name | Column Description | Permitted Values | Data Type | Mandatory | HL7 Attribute |
|---|---|---|---|---|---|
| 'CMD' | Command to create a medicine order. | 'C' | | Yes | |
| TTYP | Transaction type for medicine order | 'MO' | | Yes | |
| CLMOID | Clinical system medicine order ID | | | Yes | **Act**.id :: **SET**<**II**> **(0..*)** |
| 'DATM PatientId | D-ATM patient ID. A unique ID assigned to each patient when that patient is first enrolled in D-ATM. This ID is associated with the patient's biometric identification, e.g., fingerprint. This ID must be stored in the clinical system since this is the link between the clinical system and D-ATM. | | Integer | Yes | **Role**.id :: **SET**<**II**> **(0..*)** |
| OTPId | The D-ATM ID of the OTP creating, updating, or deleting the medicine order | Valid D-ATM OTP ID | Integer | Yes | **Entity**.id :: **SET**<**II**> **(0..*)** |
| ExpiraDt | medicine order expiration date. The date after which the medicine order is no longer valid. | | Datetime | Yes | **Act**.effectiveTime :: **GTS** **(0..1)** |
| NxtapptDt | next medical appointment date for continuing medicine order. The date of the next appointment related to the patient's medicine order for a controlled substance (e.g., Methadone), and not for other medications. | | Datetime | | **Act**.effectiveTime :: **GTS** **(0..1)** |
| Comment | Medicine Order Notes/Comment. | | Varchar(3000) | | **Act**.text :: **ED** **(0..1)** |

#### 1.10.1.3 Remove Medicine Order

This is to remove a medicine order that was created in error. A medicine order for which there are associated completed dosing events can't be removed. If a transaction is received to remove a medicine order for which there are completed dosing events, the medicine order will be expired instead.

## Remove Medicine Order

| Column Name | Column Description | Permitted Values | Data Type | Mandatory | HL7 Attribute |
|---|---|---|---|---|---|
| 'CMD' | Command to delete a medicine order. | 'R' | | Yes | |
| TTYP | Transaction type for medicine order | 'MO' | | Yes | |
| CLMOID (clinical system medicine order ID) | Clinical system medicine order ID | | | Yes | **Act**.id :: **SET**<**II**> **(0..*)** |
| PatientId | D-ATM patient ID. A unique ID assigned to each patient when that patient is first enrolled in D-ATM. This ID is associated with the patient's biometric identification, e.g., fingerprint. This ID must be stored in the clinical system since this is the link between the clinical system and D-ATM. | | Integer | Yes | **Role**.id :: **SET**<**II**> **(0..*)** |
| OTPId | The D-ATM ID of the OTP deleting the medicine order | Valid D-ATM OTP ID | Integer | Yes | **Entity**.id :: **SET**<**II**> **(0..*)** |

### Dosing Event Transactions

Using the API, completed dosing events can be created or removed.

#### 1.10.1.4 Create Completed Dosing Event

Dosing events for a patient are associated with the appropriate medicine order.

If the patient isn't enrolled in D-ATM at the OTP, the transaction will be ignored and a message will be returned.

If a completed dosing event is created for which there is no medicine order or the medicine order is expired, D-ATM will automatically create a default medicine order to cover that day. A warning message to that effect will be returned.

If a completed dosing event is received for a day that already has a completed dosing event, and if the medicine order doesn't indicate a split dose, then the duplicate dosing event will be recorded and a warning message about the duplication will be returned.

## Create Completed Dosing Event

| Column Name | Column Description | Permitted Values | Data Type | Mandatory | HL7 Mapping |
|---|---|---|---|---|---|
| 'CMD' | Command to create a completed dosing event. | 'C' | | Yes | |
| TTYP | Transaction type for completed dosing event. | 'DE' | | Yes | |
| PatientId | D-ATM patient ID. A unique ID assigned to each patient when that patient is first enrolled in D-ATM. This ID is associated with the patient's biometric identification, e.g., fingerprint. This ID must be stored in the clinical system since this is the link between the clinical system and D-ATM. | | Integer | Yes | **Role**.id :: **SET**<**II**> **(0..*)** |
| OTPId | The D-ATM ID of the OTP creating the medicine order | Valid D-ATM OTP ID | Integer | Yes | **Entity**.id :: **SET**<**II**> **(0..*)** |
| Medicine | Code for Methadone or Buprenorphine. | [M] Methadone<br>[B] Buprenorphine<br>(add others as needed) | Varchar(1) | Yes | **Class:** Material ***(in Entities)*** |
| VisitType | If the dose was given at a clinic visit or is a take home. | [C] Clinic<br>[H] Take Home | Varchar(1) | Yes | **Class:** Place ***(in Entities)*** |
| DoseAmt | The amount in milligrams of the dose provided. | | Integer | Yes | **SubstanceAdministration**.doseQuantity :: **IVL**<**PQ**> **(0..1)** |
| SplitDoseNo | If this dose was one of a split dose for the day, then indicate if dose number 1 or 2. | 1<br>2 | Interger | | |
| StatusCde | Dosing Event Status. | [D] Dispensed | Varchar(1) | Mandatory | |

| Column Name | Column Description | Permitted Values | Data Type | Mandatory | HL7 Mapping |
|---|---|---|---|---|---|
| DispensedDt | Dosing Event Dispensed Date. | | Date | Mandatory | **Act**.effectiveTime :: **GTS (0..1)** |
| TakehomeNum | The number of take home doses provided to the patient at the visit. | | Integer | | **Entity**.quantity :: **SET**<**PQ**> **(0..*)** |
| TakehomeAmt | The number in milligrams of the take home dose amount. | | Integer | | **SubstanceAdministration**.doseQuantity :: **IVL**<**PQ**> **(0..1)** |
| Comment | Dosing Event Notes/Comment. | | Varchar(1000) | | **Act**.text :: **ED (0..1)** |

#### 1.10.1.5 Remove Completed Dosing Event

To remove a completed dosing event that has been sent in error, there should already be a completed dosing event in D-ATM for that patient for that day. If not, a warning message will be returned.

## Remove Completed Dosing Event

| Column Name | Column Description | Permitted Values | Data Type | Mandatory | HL7 Mapping |
|---|---|---|---|---|---|
| 'CMD' | Command to remove a completed dosing event. | 'R' | | Yes | |
| TTYP | Transaction type for completed dosing event. | 'DE' | | Yes | |
| PatientId | D-ATM patient ID. A unique ID assigned to each patient when that patient is first enrolled in D-ATM. This ID is associated with the patient's biometric identification, e.g., fingerprint. This ID must be stored in the clinical system since this is the link between the clinical system and D-ATM. | | Integer | Yes | **Role**.id :: **SET**<**II**> **(0..*)** |
| OTPId | The D-ATM ID of the OTP creating the medicine order | Valid D-ATM OTP ID | Integer | Yes | **Entity**.id :: **SET**<**II**> **(0..*)** |
| DispensedDt | Dosing Event Dispensed Date. | | Date | Mandatory | **Act**.effectiveTime :: **GTS** **(0..1)** |

## 1.11 Interface Transactions from D-ATM to Clinical System

OTPs have an interest in dosing events administered by other OTPs to their patients (patients for whom the OTP has a current medicine order). Therefore, whenever D-ATM detects that a dose was administered to a patient that has a current medicine order at another OTP, this event is recorded for the other OTPs in its 'queue of patient visit events occurring at other OTPs.'

OTPs also have an interest in knowing when another OTP retrieves or attempts to retrieve dosing information for one of its patients. For this reason, whenever D-ATM detects that an OTP retrieved or attempted to retrieve dosing information for a guest patient, this event is recorded for the home OTP in its queue of patient visit events occurring at other OTPs. However, once the patient is enrolled in D-ATM as a guest patient at the guest OTP, the retrieval events are not longer recorded for the home OTP. Dosing events administered by guest OTPs are still recorded.

Note that while OTPs may receive an email message concerning an event for one of its patients at another OTP, the email will not include confidential details. These details are recorded in the system in the OTP's queue of patient visit events occurring at other OTPs.

When an OTP other that the patient's home OTP access and/or retrieves dosing information for a patient, the home OTP will receive an informational message. The purpose is to let the home OTP know when another OTP retrieves or attempts to retrieve dosing information for one of its patients. Once the patient is enrolled as a guest in the other OTP, these messages are no longer sent to the home OTP and the retrieval and access events are no longer recorded in the home OTPs queue of patient visit events. (Dosing events, however, are still recorded.)

The following transactions represent data sent from D-ATM to the clinical system when the clinical system issues a request to D-ATM to retrieve patient visit events occurring at other OTPS. Patient visit events can be requested several ways.

It is recommended that the clinical system be enhanced to process these transactions, including allowing clinical staff to:

- View and print the patient visit events that occurred at other OTPs in a user-friendly format;
- Manually update local records to reflect dosing events that occurred at other OTPs;
- Electronically update local records to reflect dosing events that occurred at other OTPs.

The transactions that are intended to be communicated from D-ATM to the clinical system include the three types of patient visit events that occur at other OTPs:

- Dose administered to a patient with a current medicine order at requesting OTP by another OTP;

- Access by another OTP of dosing information for a home patient at the requesting OTP;
- Retrieval by another OTP of dosing information for a home patient at the requesting OTP.

Note that once a patient is enrolled as a guest patient at a guest OTP, access and retrieval events are no longer recorded in the home OTP's queue of patient visit events. Dosing events, however, are still recorded in this queue.

## Dose Administered to Patient with a Current Medicine Order at the Requesting OTP by Another OTP

| Column Name | Column Description | Permitted Values | Data Type | Mand-atory | Business Rules |
|---|---|---|---|---|---|
| 'CMD' | Command | 'RTR | | Yes | Retrieve |
| TTYP | Transaction type for completed dosing event. | 'DE' | | Yes | |
| DATMPatientId | D-ATM patient ID. A unique ID assigned to each patient when that patient is first enrolled in D-ATM. This ID is associated with the patient's biometric identification, e.g., fingerprint. This ID must be stored in the clinical system since this is the link between the clinical system and D-ATM. | | Integer | Yes | **Role**.id :: **SET**<**II**> **(0..*)** |
| OTPId | The D-ATM ID of the OTP that provided the dose. | Valid D-ATM OTP ID | Integer | Yes | **Entity**.id :: **SET**<**II**> **(0..*)** |
| OTPName | The name of the OTP that provided the dose. | | | | **Entity**.name :: **BAG**<**EN**> **(0..*)** |
| ContactName | The name of the staff member at the OTP to contact. | | | | |
| ContactPhone | The phone number of the staff member at the OTP to contact. | | | | |
| ContacteMail | The email address of the staff member at the OTP to contact. | | | | |
| HomeOTPId | The D-ATM ID of the patient's home OTP. | Valid D-ATM OTP ID | Integer | Yes | **Entity**.id :: **SET**<**II**> **(0..*)** |
| Medicine | Code for Methadone or Buprenorphine. | [M] Methadone<br>[B] Buprenorphine<br>(add others as needed) | Varchar(1) | Yes | **Entity**.id :: **SET**<**II**> **(0..*)** |
| VisitType | If the dose was given at a clinic visit or is a take home. | [C] Clinic<br>[H] Take Home | Varchar(1) | Yes | **Class:** Place ***(in Entities)*** |

| | | | | | |
|---|---|---|---|---|---|
| DoseAmt | The amount in milligrams of the dose provided. | | Integer | Yes | **SubstanceAdministration**.doseQuantity :: **IVL**<**PQ**> **(0..1)** |
| SplitDoseNo | If this dose was one of a split dose for the day, then indicate if dose number 1 or 2. | 1<br>2 | Interger | | |
| EventDate | Dosing Event Dispensed Date. | | Datetime | Yes | **Act**.effectiveTime :: **GTS** **(0..1)** |
| TakehomeNum | The number of take home doses provided to the patient at the visit. | | Integer | | **Entity**.quantity :: **SET**<**PQ**> **(0..*)** |
| TakehomeAMT | The number in milligrams of the take home dose amount. | | Integer | | **SubstanceAdministration**.doseQuantity :: **IVL**<**PQ**> **(0..1)** |
| Comment | Dosing Event Notes/Comment. | | Varchar(1000) | | **Act**.text :: **ED** **(0..1)** |

### Retrieval or Access Attempt by another OTP of Dosing Information for a Home Patient of the Requesting OTP

| Column Name | Column Description | Permitted Values | Data Type | Mand-atory | HL7 Attribute |
|---|---|---|---|---|---|
| 'CMD' | Command to Retrieve | 'Ret' | | Yes | |
| TTYP | Transaction type for completed guest retrieval event. | 'GRet'<br>'GAcc' | | Yes | |

| | | | | | |
|---|---|---|---|---|---|
| | | (guest retrieval; guest access) | | | |
| DATMPatientId | D-ATM patient ID. A unique ID assigned to each patient when that patient is first enrolled in D-ATM. This ID is associated with the patient's biometric identification, e.g., fingerprint. This ID must be stored in the clinical system since this is the link between the clinical system and D-ATM. | | Integer | Yes | **Role**.id :: **SET**<**II**> **(0..*)** |
| Guest OTPId | The D-ATM ID of the guest OTP that provided the dose. | Valid D-ATM OTP ID | Integer | Yes | **Entity**.id :: **SET**<**II**> **(0..*)** |
| GuestOTPName | The name of the guest OTP that provided the dose. | | | | **Entity**.name :: **BAG**<**EN**> **(0..*)** |
| ContactName | The name of the staff member at the OTP to contact. | | | | |
| ContactPhone | The phone number of the staff member at the OTP to contact. | | | | |
| ContacteMail | The email address of the staff member at the OTP to contact. | | | | |
| GuestEvent Date | Date that the guest OPT attepted to access dosing information for a home patient of another OTP. | | Datetime | Yes | **Act**.effectiveTime :: **GTS** **(0..1)** |

## 1.12 HL7 Classes/Subclasses/Attributes Mapped to D-ATM SW Interface Transactions and Data Elements

| HL7 Class/ Subclass/ Attribute | D-ATM Transaction | D-ATM Data Element |
|---|---|---|
| Class<br>Act | Medicine Order<br>Dosing Event<br><br>Both may be either the subclass *Substance Administration* or *Patient Encounter*. | |
| Attribute<br>**Act**.moodCode | A mandatory attribute of Act is mood. For Medicine Orders, the mood would be 'Intent', and for completed dosing events, the mood would be 'Event'. | |
| Attribute<br>**Act**.id | Create Medicine Order;<br>Update Medicine Order;<br>Remove Medicine Order;<br>Create Completed Dosing Event; | Clinical System Medicine Order ID (CLMOID) |
| Attribute<br>**Act**.text | Create Medicine Order;<br>Update Medicine Order;<br>Create Completed Dosing Event;<br>Dose Admin.to patient by Another OTP; | Medicine Order Comment (Comment );<br>Dosing Event Comment |
| Attribute<br>**Act**.<br>effectiveTime | Create Medicine Order;<br>Update Medicine Order;<br>Create Completed Dosing Event; Remove Dosing Event;<br>Dose Admin.to Patient by Another OTP;<br>Retrieval of Patient Dosing by Another OTP;<br>Access of Patient Dosing by Another OTP | Medicine Order effective date (EffectDt);<br>Medicine Order expiration date (ExpiraDt);<br>Next Appointment Date (NxtapptDt);<br>Dispensing Date (DispensedDt);<br>Event Date (EventDate);<br>GuestEventDate |
| Attribute<br>**Act**.<br>ReasonCode | Create Medicine Order; | Medicine Order Reason (Reason) |

| **HL7 Class/ Subclass/ Attribute** | **D-ATM Transaction** | **D-ATM Data Element** |
|---|---|---|
| Subclass<br>PatientEncounter<br>***(in Acts)*** | | |
| Subclass<br>SubstanceAdministration<br>***(in Acts)*** | | |
| Attribute<br>**SubstanceAdm-inistration**.doseQuantity :: **IVL**<**PQ**><br>**(0..1)** | Create Medicine Order;<br>Create Completed Dosing Event;<br>Dose Admin.to Patient by Another OTP;<br>Dose Admin.to Patient by Another OTP; | DoseAmt<br>(TakehomeAmt) |
| Class<br>Entity ***(in Entities)*** | | |
| Attribute<br>**Entity**.id | Create Medicine Order;<br>Update Medicine Order;<br>Remove Medicine Order;<br>Create Completed Dosing Event; Remove Dosing Event;<br>Dose Admin. To Patient by Other OTP; Retrieval of Patient Dosing by Another OTP;<br>Access to Patient Dosing by Another OTP | OTPId; Medicine; HomeOTPId; Guest OTPId |
| Attribute<br>**Entity**.<br>classCode | | |
| Attribute<br>**Entity**.<br>quantity | Create Medicine Order;<br>Create Completed Dosing Event;<br>Dose Admin.to Patient by Another OTP; | Number of Take homes approved<br>(TakehomeNum) |
| Attribute<br>**Entity**.<br>name | Dose Admin.to Patient by Another OTP;<br>Retrieval of Patient Dosing by Another OTP;<br>Access to Patient Dosing by Another OTP | OTPName; GuestOTPName |
| Subclass<br>Material<br>***(in Entities)*** | | |
| Subclass<br>Organization<br>***(in Entities)*** | | |

| **HL7 Class/ Subclass/ Attribute** | **D-ATM Transaction** | **D-ATM Data Element** |
|---|---|---|
| Subclass<br>Place<br>***(in Entities)*** | Create Completed Dosing Event; Dose Admin. to patient by Another OTP; | Visit Type (VisitType) (home or clinic) |
| Class<br>Role | | |
| Attribute<br>**Role**.id | Create Medicine Order;<br>Update Medicine Order;<br>Remove Medicine Order;<br>Create Completed Dosing Event;<br>Remove Dosing Event;<br>Dose Admin.to patient by other OTP;<br>Retrieval of Patient Dosing by Another OTP;<br>Access of Patient Dosing by Another OTP | 'DATM PatientId' |
| Subclass<br>Patient<br>***(in Roles)*** | | |

## 1.13 Representing a Complex Medicine Order using HL7

For simplicity, the above tables use individual HL7 attributes to represent D-ATM data elements. However, it is possible to use HL7 attributes as expressions to represent complex concepts, such as in a medicine order.

The majority of OTP medicine orders are for a stable dose in which the daily dose is always the same. However, new OTP patients are usually issued a medicine order in which the dose is built up over a period of time until a stable dose is reached. Also, patients that chose to stop treatment for whatever reason, such as detoxification, are issued a medicine order in which the dose is gradually reduced.

### 1.13.1 Representing a Stable Dose

To represent a stable dose in HL7, a dose quantity and effective time are used together to represent this. The dose quantity indicates the mg portion. The effective time indicates ‘every number of days for some period of time’. The HL7 data types PIVL and IVL would be used. PIVL is a data type representing an interval of time that recurs periodically. Periodic intervals have two properties, phase and period. Phase is represented as IVL<T> and is the repeating interval specifying the duration of each occurrence and anchors the periodic interval sequence at a certain point in time. Period (PQ) is a time duration specifying as a reciprocal measure of the frequency at which the periodic interval repeats. Phase also marks the anchor point in time for the entire series of periodically recurring intervals.

To express ‘100 mg every day for a week’, there would be a substance administration class with the dose quantity of 100 mg and an effective time of PIVL intersect IVL in which the PIVL would be every day and the interval would be 1 week.

### 1.13.2 Representing a Varying Dose

A varying OTP medicine order may be expressed either of two ways:

- ‘Starting dose of 60 mg, increasing by 10 mg every 3 days until 120 mg is reached.’
- ‘Starting dose of 60 mg, increasing by 10 mg every 3 days for 6 weeks.’

While it isn’t completely clear how to represent a varying dose using HL7, the data type ‘GeneratedSequence(GLIST)’ appears to be a good candidate. A generated sequence is a periodic or monotone sequence of values generated from a few parameters, rather than being enumerated.

The generated sequence is expressed as:

*Type GeneratedSequence<QTY T> alias GLIST specializes LIST<T> (*

*T head;*

*QTY increment;*

*INT period;*

*INT denominator;*

*)*

Head (T) is the first item in the sequence. This is a definitional property for the semantics of the sequence. *In other words, this would be the starting amount for the dose, or in the above example, 60 mg.*

Increment (QTY) is the difference between one value and its previous different value. For example, to generate the sequence (1; 4; 7; 10; 13; …) the increment is 3. Likewise, to generate the sequence (1; 1; 4; 4; 7; 7; 10; 10; 13; 13; …) the increment is also 3. *In other words, this would be the amount by which the dose is varied, or in the above example, 10 mg.*

Period (INT) specifies that the sequence alternates, i.e., after this many increments, the sequence item values roll over to start from the initial sequence item value. *Period would not be used in a medicine order.*

Denominator (INT) is the integer by which the index for the sequence is divided, effectively the number of times the sequence generates the same sequence item value before incrementing to the next sequence item value. For example, to generate the sequence (1; 1; 1; 2; 2; 2; 3; 3; 3; …) the denominator is 3. *In other words, the denominator represents the number of days after which the dose is varied by the Increment, or in the above example, 3 days.*

In summary, using the GLIST, ‘Starting dose of 60 mg, increasing by 10 mg every 3 days until 120 mg is reached’ would be represented with a Head of 60, Increment of 10, and Denominator or 3.

# Appendix

## Glossary of HL7 Classes, Subclasses, and Attributes Used in D-ATM Software Interface

| HL7 Class/ Subclass/ Attribute | HL7 Class/Subclass/Attribute Definition/Discussion |
|---|---|
| Class<br>Act | An Act is an action of interest that has happened, can happen, is happening, is intended to happen, or is requested/demanded to happen. An act is an intentional action in the business domain of HL7. Healthcare (and any profession or business) is constituted of intentional actions. An Act instance is a record of such an intentional action.<br>*Example:* Treatment services, such as medication. |
| Attribute<br>**Act**.moodCode | The moodCode distinguishes between Acts that are meant as factual records (e.g., completed dosing events), vs. records of intended or ordered services (medicine order). |
| Attribute<br>**Act**.id | A unique identifier for the Act. |
| Attribute<br>**Act**.text | A textual or multimedia description (or reference to a description) of the Act.<br><br>*Examples:* For act definitions, the Act.text can contain textbook-like information about that act. For act orders, the description will contain particular instructions pertaining only to that order.<br><br>*Constraints:* No restriction on length or content is imposed on the Act.text attribute.<br><br>The content of the description is not considered part of the functional information communicated between computer systems. For Acts that involve human readers and performers, however, computer systems must show the Act.text field to a human user, who has responsibility for the activity; or at least must indicate the existence of the Act.text information and allow the user to see that information.<br><br>Free text descriptions are used to help an individual interpret the content and context of the act, but all information relevant for automated functions must be communicated using the proper attributes and associated objects. |
| Attribute<br>**Act**.effectiveTime | *Definition:* A time expression specifying the focal or operative time of the Act, the primary time for which the Act holds, the time of interest from the perspective of the Act's intention.<br>*Example:* For substance administrations, the effective time is the time over which the substance is to be administered, including the frequency of administration (e.g. TID for 10 days)<br><br>*Definition:* A time expression specifying the focal or operative time of the Act, the primary time for which the Act holds, the time of interest from the perspective of the Act's intention.<br><br>*Examples:* For clinical Observations, the effectiveTime is the time at |

| HL7 Class/ Subclass/ Attribute | HL7 Class/Subclass/Attribute Definition/Discussion |
|---|---|
| | which the observation holds (is effective) for the patient.<br><br>For substance administrations, the effective time is the time over which the substance is to be administered, including the frequency of administration (e.g. TID for 10 days)<br><br>For patient encounters, this is the "administrative" time, i.e., the encounter start and end date required to be chosen by business rules, as opposed to the actual time the healthcare encounter related work is performed.<br><br>*Discussion:* The effectiveTime is also known as the "primary" time (Arden Syntax) or the "biologically relevant time" (HL7 v2.x). This attribute is |
| Attribute<br>**Act**.reasonCode | A code specifying the motivation, cause, or rationale of an Act. |
| Subclass<br>PatientEncounter<br>***(in Acts)*** | An interaction between a patient and care provider(s) for the purpose of providing healthcare-related service(s). |
| Subclass<br>SubstanceAdministration ***(in Acts)*** | The act of introducing or otherwise applying a substance to the subject.<br>*Example:* Drug prescription. |
| Attribute<br>**SubstanceAdministration**.doseQuantity | The amount of the therapeutic agent or other substance given at one administration event.<br><br>*Discussion:* The dose may be specified either as a physical quantity of active ingredient (e.g. 200 mg) or as the count of administration-units (e.g., tablets, capsules, "eaches").<br><br>*Discussion:* The dose may be specified either as a physical quantity of active ingredient (e.g. 200 mg) or as the count of administration-units (e.g., tablets, capsules, "eaches"). Which approach is chosen depends upon the player of the 'consumable' participation (which identifies the drug being administered). If the consumable has a non-countable dosage form (e.g. measured in milligram or litre) then the dose must be expressed in those units. If the consumable has a countable dosage form (tablets, capsules, "eaches"), then the dose must be expressed as a dimensionless count (i.e., with no other unit of measure specified).<br><br>The unit of measure is restricted to a measurable unit such as milliliters and milligrams. |
| Class<br>Entity ***(in Entities)*** | An Entity is a class or specific instance of a physical thing or an organization/group of physical things capable of participating in Acts; an artifact. This includes living subjects, organizations, material, and places. The Entity hierarchy encompasses human beings, organizations, living organisms, devices, pharmaceutical substances, etc. It does not include events/acts/actions, the definition of things, or the roles that things can play (e.g. patient, provider). |
| Attribute<br>**Entity**.id | A unique identifier for the Entity. |

| HL7 Class/ Subclass/ Attribute | HL7 Class/Subclass/Attribute Definition/Discussion |
|---|---|
| Attribute<br>**Entity**.classCode | An HL7 defined value representing the class or category that the Entity instance represents.<br>*Examples:* Person, Animal, Chemical Substance, Group, Organization |
| Attribute<br>**Entity**.quantity | *Definition:* The number or quantity of the Entity, with appropriate units.<br><br>*Examples:* With undetermined kinds, the quantity is but a reference quantity for the specification of the proportion of ingredients or components (e.g. through a has-part, has-ingredient, or has-content Role). For example, a kind of group with 60% females is Person(quantity = 100) has-part Person(quantity = 60; sex = female). Amoxicillin 500 mg per tablet is Material(Tablet, quantity = 1) has-ingredient Material(Amoxicillin, quantity = 500 mg). Glucose 5% (D5W) is Material(D5W, quantity = 1 kg) has-ingredient Material(Glucose, quantity = 50 g).<br><br>Material-specific quantity relations are expressed using the fact that the data type of this attribute is a set of physical quantity (SET<PQ>). If more than one quantity value are specified in this set, each element in this set is considered to specify the same amount of the material. For example, for one liter of water one could use the set 1 L, 1 kg, 55.56 mol to specify the volume, mass, and amount of substance for the same amount of water, this is equivalent with specifying the mass density (volumic mass 1 kg/L) and the molar mass (18 g/mol). For Glucose one could specify 180 g, 1 mol according to the molar mass (180 g/mol). |
| Attribute<br>**Entity**.name | *Definition:* A non-unique textual identifier or moniker for the Entity.<br>*Examples:* Proper names, nicknames, legal names of persons, places or things.<br><br>*Examples:* Proper names, nicknames, legal names of persons, places or things.<br><br>*Rationale:* Most entities have a commonly used name that can be used to differentiate them from other Entities, but does not provide a unique identifier. |
| Subclass<br>Material<br>***(in Entities)*** | A subtype of Entity that is inanimate and locationally independent.<br>*Examples:* Pharmaceutical substances (including active vaccines containing retarded virus), disposable supplies, durable equipment, implantable devices, food items (including meat or plant products), waste, traded goods, etc. |
| Subclass<br>Organization<br>***(in Entities)*** | An Entity representing a formalized group of entities with a common purpose (e.g. administrative, legal, political) and the infrastructure to carry out that purpose.<br>*Examples:* Companies and institutions, a government department, an incorporated body that is responsible for administering a facility, an insurance company. |
| Subclass<br>Place<br>***(in Entities)*** | Place is a specialization of: Entity. A subtype of Entity representing a bounded physical place or site with its contained structures, if any.<br><br>*Discussion:* Places may be work facilities (where relevant acts occur), homes (where people live) or offices (where people work). Places may |

| **HL7 Class/ Subclass/ Attribute** | **HL7 Class/Subclass/Attribute Definition/Discussion** |
|---|---|
| | contain sub-places (floor, room, booth, bed). Places may also be sites that are investigated in the context of health care, social work, public health administration (e.g., buildings, picnic grounds, day care centers, prisons, counties, states, and other focuses of epidemiological events).<br><br>*Examples:* A field, lake, city, county, state, country, lot (land), building, pipeline, power line, playground, ship, truck.<br><br>*Constraints:* Place may be natural or man-made. The geographic position of a place may or may not be constant. |
| Class<br>Role | *Definition:* A unique identifier for the player Entity in this Role.<br><br>A Role is a categorization of competency of the Entity that plays the Role as defined by the Entity that scopes the Role.<br><br>Each role is "played" by one Entity, called the "player" and is "scoped" by another Entity, called the "scoper". Thus the Role of "patient" may be played by a person and scoped by the provider organization from which the patient will receive services. |
| Attribute<br>**Role**.id | The identifier of the Role identifies the Entity playing the role in that role. |
| Subclass<br>Patient<br>***(in Roles)*** | A Role of a LivingSubject (player) as a recipient of health care services from a healthcare provider (scoper). Patient is a specialization of Role. |