Description of the MHS Health Level 7 Pharmacy Intravenous Data for Public Health Surveillance
Technical Document NMCPHC-EDC-TD-4-2014

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November 2009

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REPORT DOCUMENTATION PAGE			*Form Approved* *OMB No. 0704-0188*
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1. REPORT DATE *(DD-MM-YYYY)* 30-10-2009	2. REPORT TYPE Technical Document		3. DATES COVERED *(From - To)* July 2009 - November 2009
4. TITLE AND SUBTITLE Description of the MHS Health Level 7 Pharmacy Intravenous Data for Public Health Surveillance			5a. CONTRACT NUMBER
			5b. GRANT NUMBER
			5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S) Ashleigh McCabe			5d. PROJECT NUMBER
			5e. TASK NUMBER
			5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Navy and Marine Corps Public Health Center EpiData Center Department 620 John Paul Jones Circle, Suite 1100 Portsmouth, VA 23708			8. PERFORMING ORGANIZATION REPORT NUMBER NMCPHC-EDC-TD-4-2014
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Navy and Marine Corps Public Health Center EpiData Center Department 620 John Paul Jones Circle, Suite 1100 Portsmouth, VA 23708			10. SPONSOR/MONITOR'S ACRONYM(S) NMCPHC-EDC
			11. SPONSOR/MONITOR'S REPORT NUMBER(S) NMCPHC-EDC-TD-4-2014
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release. Distribution is not limited.			
13. SUPPLEMENTARY NOTES			
14. ABSTRACT The EpiData Center Department (EDC) at the Navy and Marine Corps Public Health Center evaluated the Health Level 7 (HL7) data source for its usefulness in health surveillance activities. This technical document provides a history of the HL7 pharmacy intravenous database and its contents, explains the creation of prescription records, describes the pathway of data from healthcare provider to the EDC, provides a detailed descriptions of all variables within the database, and assesses the database's strengths and limitations. Given an understanding of the strengths and limitations of the data, HL7 pharmacy intravenous data have proven to be a valuable source of health information for surveillance purposes. The data can be used for case identification when disease-specific treatment is available, or used to assess clinical practice guideline adherence for known cases. Furthermore, data are received in a timely fashion, allowing for near-real-time surveillance of diseases.			
15. SUBJECT TERMS Health Level 7 (HL7), Pharmacy, Unit-Dose, Prescription, Surveillance			

16. SECURITY CLASSIFICATION OF: U			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Ashleigh McCabe
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U	UU	25	19b. TELEPHONE NUMBER *(include area code)* 757-953-0692

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

Abstract

The EpiData Center Department (EDC) at the Navy and Marine Corps Public Health Center evaluated the Health Level 7 (HL7) data source for its usefulness in health surveillance activities. This technical document provides a history of the HL7 pharmacy intravenous database and its contents, explains the creation of prescription records, describes the pathway of data from healthcare provider to the EDC, provides a detailed descriptions of all variables within the database, and assesses the database's strengths and limitations. Given an understanding of the strengths and limitations of the data, HL7 pharmacy intravenous data have proven to be a valuable source of health information for surveillance purposes. The data can be used for case identification when disease-specific treatment is available, or used to assess clinical practice guideline adherence for known cases. Furthermore, data are received in a timely fashion, allowing for near-real-time surveillance of diseases.

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Executive Summary

Project Background

The EpiData Center (EDC) at the Navy and Marine Corps Public Health Center (NMCPHC) was funded to evaluate the Health Level 7 (HL7) Pharmacy Intravenous (IV) data source for its usefulness in public health surveillance. This technical document is the result of the analysis of the IV data which is one of three pharmacy data types: outpatient, unit-dose, and intravenous. The IV dataset contains the intravenous pharmacy records associated with inpatient and outpatient (ambulatory) visits since 6 July 2009.

Public Health Surveillance Applications

IV data add a unique layer to the EDC's surveillance efforts. Because these data are not limited to laboratory confirmed cases, they can provide information on presumptively treated cases, which are common due to over-burdened facilities and limited treatment options. Also, where the treatment of a disease uses a specific medication, these data can indicate the diagnosis more precisely than the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes from encounter records, since the codes in these records may be imprecise. Data on pharmacy transactions, therefore, can improve the robustness of surveillance systems based on lab results and/or ICD-9-CM coded records.

Key Fields for Public Health Surveillance

Specific key fields for Public Health Surveillance are included in the data: RXC segment data, sponsor ID, family member prefix (FMP), service, requesting facility, and performing facility.

True duplicates are defined as records in which all fields are exactly the same. After true duplicates are eliminated, the data can be analyzed by unique patient, order, or record. *Unique patients* are identified in the HL7 pharmacy data through a combination of sponsor ID and FMP, this combination creates a unique identifier that can be used to track individual patients through all pharmacy records. A *unique order* is defined as all records associated with each specific drug prescription. A *unique record* is defined as all transactions associated with each prescription for an individual patient.

The RXC segment data contains the National Drug Code (NDC) number, drug name, amount, and units. This information has several unique characteristics that should be considered prior to analysis.

Strengths

Several of the data fields of interest are complete but the completeness of the database as a whole continues to be assessed. The analysis showed that data were collected in the Composite Health Care System (CHCS) from the majority of the DOD military treatment facilities (MTFs). The timeliness of reporting is within the acceptable range for the Navy surveillance activities, 1-3 days.

Limitations

It is currently not clear whether Defense Health Services Systems (DHSS) captures all CHCS pharmacy transactions. Further work is needed to compare HL7 pharmacy records to other data sources in order to estimate completeness. The IV data only include MTFs that have CHCS servers. Therefore, forward deployed clinics, contracted managed care support clinics, and other MTFs that do not use CHCS are not captured in these data unless the prescription is taken to an MTF to be filled at a pharmacy that uses CHCS. Incomplete demographic information (e.g., unspecified marital status, race, or ethnicity) can limit the generalizability of these data to specific minority groups. Extra precautions need to be taken when extrapolating data to larger populations and when comparing disease rates and trends among the military to non-military populations.

Introduction

The EpiData Center (EDC) at the Navy and Marine Corps Public Health Center (NMCPHC) was funded to evaluate the Health Level 7 (HL7) Pharmacy data source for its usefulness in public health surveillance. This technical document resulted from the analysis of the Pharmacy Intravenous dataset which is one of three pharmacy data types: outpatient, unit-dose, and intravenous. The pharmacy intravenous (IV) dataset records intravenous prescriptions filled at a military treatment facility (MTF) for prescriptions generated during inpatient or outpatient (ambulatory) visits. Records for all Department of Defense (DOD) military service members (Army, Navy, Marine Corps, Air Force, Coast Guard, and US Public Health Service), overseas civilian personnel, Tri-Care eligible dependents, and others who receive their prescriptions at a military MTF are included in this dataset. The following document describes the original observations on the data fields, some basic frequencies, the cleaning rules implemented for usability, and other comments relevant to the use of these data for surveillance.

Initial evaluation of the dataset involved one sample IV extract received by the EDC from the Defense Health Services System (DHSS). This was a very small dataset used to analyze the structure, completeness, and distribution of the entire data set. The IV extract was received for Message dates between 6 July 2009 and 25 July 2009. Descriptive analysis on these data included frequency distribution of demographic fields, evaluation of null or invalid values for key fields used in surveillance, and understanding data structure in the extracts received compared to the structure as data is entered into the Composite Health Care System (CHCS). The extract was reviewed and analyzed in order to determine applicability for surveillance and modify the data structure to more accurately address the disease surveillance needs of the Navy and Marine Corps, as well as other services. The current data archive dates back to 6 July 2009.

Data Origination and Flow Process

The pharmacy IV dataset includes all prescriptions that are filled at an MTF pharmacy. There are several mechanisms of entry that can occur. The most common process followed is described below along with notable exceptions.

The prescribing physician initially enters a medication order into the CHCS system. The pharmacist receives the order via CHCS and verifies it. When the pharmacist fills the order and dispenses the medication, he or she completes the record and saves it in the local CHCS system. If a prescription is edited upon verification, edits are made in the CHCS record. Once prescriptions are filled medical personnel in the hospital dispense them to the patient according to the order. The pharmacist has the ability to cancel prescriptions per the physician. Each time a record is canceled, changed, edited, reordered, or refilled a new record in CHCS is generated.

The HL7 pharmacy data are limited to prescriptions filled at an MTF pharmacy that uses CHCS. If prescription orders are entered into CHCS and not filled (a label is not printed at the pharmacy), these medications are not seen in the HL7 pharmacy IV dataset. Prescriptions filled in a purchased care pharmacy are also not included in this dataset. However, HL7 is not the only source for pharmacy data in the Military Health System (MHS). The Pharmacy Data Transaction Service (PDTS) is a centralized data repository that collects prescription information for all DOD beneficiaries that are filled at MTFs, retail locations, and mail order pharmacies. PDTS is set up as real time provider of transaction support to ensure patient safety. Though this data source would contain additional medication records, it does not include inpatient records. PDTS data are not currently available to the EDC.

Public Health Surveillance Applications

IV data add a unique layer to the EDC's surveillance efforts. Because these data are not limited to laboratory confirmed cases, they can provide information on presumptively treated cases, which are common due to over-burdened facilities and limited treatment options. Also, where the treatment of a disease uses a specific medication, these data can indicate the diagnosis more precisely than the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes from encounter records, since the codes in these records may be imprecise. Data on pharmacy transactions, therefore, can improve the robustness of surveillance systems based on lab results and/or ICD-9-CM coded records.

The greatest value of pharmacy data for the Navy and Marine Corps currently lies in disease-specific treatments. However, many symptoms and treatments are not specific to a particular disease or condition. It is therefore necessary to fully understand the treatments for a disease and be aware of other indications for which those treatments may be used. Treatments for conditions such as influenza, malaria, and tuberculosis are relatively specific and may be useful proxies for a diagnosis when the dosage and length of treatment are also considered.

Current surveillance methods in the EDC include monitoring HL7 lab results, ICD-9-CM codes or encounters recorded in the Standard Ambulatory and Inpatient Data Record (SADR/SIDR), and outpatient pharmacy prescriptions. Consequently, surveillance methods are largely disease-specific, but this specificity depends on ICD-9-CM coding practices in local MTFs, timeliness of lab testing, and ability to accurately flag lab tests of interest. The use of pharmacy data will greatly improve the surveillance of certain infectious diseases, such as tuberculosis, because other data on these diseases are so limited by delayed lab test results and gross inaccuracies in ICD-9-CM coding.

Potential use of HL7 pharmacy records is not limited to surveillance. Data on dispensed medications can fill critical gaps in the military's ability to track medication compliance with regard to outcomes such as treatment of latent tuberculosis infection, high blood pressure, diabetes, or sexually transmitted diseases. Coupled with laboratory and encounter data, disease management guidelines can be evaluated. Finally, these data may provide valuable insight into antibiotic therapy and subsequent emerging resistance.

Data Structure and Analysis

HL7 pharmacy data are retrieved by the EDC in a standard, pipe-delimited flat file from DHSS. Each column within the data file is a fixed variable and each row should contain a unique record. Each person can have more than one distinct record, if they have multiple medications, edits, reorders, or cancellations. Each medication prescribed is associated with a unique record (row). Any additional changes (edits, cancellations, refills, etc.) to that record are in a separate record than the original, but have the same order number. The variable fields are designed to ease analysis, except for the free text fields, which require the use of wildcards or search terms.

Key Fields for Public Health Surveillance

Defining Duplicates

Within the HL7 pharmacy dataset there are several ways in which unique records can be identified. Duplicate rules should be checked against project objectives to ensure the desired outcome results. *True duplicates* are defined as records in which all fields are exactly the same. Records meeting this criterion should be eliminated. After true duplicates are eliminated, analysis should take into account that any changes to a new or existing medication transaction appear as a separate record in the HL7 database. As described below, the data can be analyzed by unique prescription order, individual, or medication

Unique ID/Case

Patients are identified in the HL7 pharmacy data through a combination of sponsor ID and family member prefix (FMP). This combination creates a unique identifier that can be used to track individual patients through all pharmacy records. It is important to note that it is possible for individuals to have two separate sponsor IDs over time. For example, if the child of a sponsor becomes active duty, then that child will have his/her own sponsor ID. Each unique patient can have multiple medication orders in the HL7 pharmacy data. A *unique order* is defined as all records associated with a single specific drug prescription (one medication). Each medication prescribed and filled is assigned its own unique order number. The combination of sponsor ID, FMP, and order number creates an additional unique identifier at the level of order. Using this unique order identifier, the analyst will be able to identify an original order and all changes and modifications made to that order, such as dosage and administration order changes. It is important to note that the data do not contain all medications that were ordered, only those medications for which a label was printed in the pharmacy. Each unique order can have multiple records within the HL7 pharmacy data. A *unique record* is defined as an individual transaction associated with each prescription for an individual patient (new order, edited order, or cancelled order). The combination of sponsor ID, FMP, order number, and order control creates a final unique identifier that matches each completed transaction to a specific prescription order. One unique order may have multiple unique records depending on any changes in the transaction. The values of order control represent the status of the prescription, and it is often necessary for cancelled, edited, replaced, and discontinued records to be removed prior to analysis.

Medication Dispensed

The RXC segment data field relates directly to the medication dispensed, and is composed of the following information: NDC number, drug name, amount, and units. This information has several unique characteristics that should be considered prior to analysis.

Strengths

Timeliness

DHSS includes several date and time fields in the dataset provided to the EDC: message date, DHSS load date, and transaction date. A timeline of dates is provided in Appendix E. To assess the timeliness of the data, the transaction date (date the order was placed into CHCS by the provider) was compared to the message date (date the HL7 message was generated by CHCS) to estimate the time between the patient encounter and the receipt of data at DHSS. The message date was also compared to the DHSS load date in order to determine the time between HL7 message generation at the local CHCS host and DHSS data parsing of the HL7 message into the database design.

On average, it took less than a day for an HL7 message to be generated. After generation, it took about 1 day for the message to be processed by DHSS with a range of 0-12 days (the most frequent lag times are 0 (11.2%), 1 (85.7%), and 2 days (2.3%)). It is assumed that NMCPHC receives these data within two days, though this assumption should be verified in the future as time permits. This interval indicates that the timeliness of reporting is within acceptable ranges for the Navy surveillance activities. Future analysis and assessment should better define lag times in relation to particular MTFs, drugs, or disease outcomes of interest.

Completeness

Records are received from the majority of shore-based MTFs of the CHCS, but gaps in the data may exist. Gaps in data may occur due to server failure at location or due to functional errors. It is believed that these data represent at least 90% of all filled prescriptions in CHCS. The completeness of individual fields varies and the characteristics of each are described in detail in the field observations section that appears later in this document. In general, some fields of particular interest, such as sponsor ID, FMP, and service are highly populated due to the business rules of CHCS.

Limitations

Completeness

Previous DHSS studies have evaluated their capture of pharmacy transactions from the local MTF. However, these studies were limited to one MTF and one day. It is currently not clear whether DHSS captures all CHCS pharmacy transactions. Further work is needed to compare HL7 pharmacy records to other data sources in order to estimate completeness.

The HL7 infrastructure at DHSS was built using pilot funds but as of March 2009 is a functional, funded program. Initially, a temporary network was created to capture HL7 messages when they are sent from the CHCS host to the Denver feed node. Up until the program became formal, no back-up system existed. When the feed node fails, HL7 messages may be lost and those that have been sent may not be retrievable unless the network outage was planned for in advance. Gaps may exist in the data received at NMCPHC. Several of the identified data fields of Public Health interest are highly populated, but other are not highly populated. The completeness of each data field, as described later in this document, should be considered before its use in analysis.

Inclusion

The IV data only includes MTFs that have CHCS servers. Forward deployed clinics, contracted managed care support clinics, and other MTFs that do not use CHCS are not captured in these data unless the prescription is filled by a pharmacy that uses CHCS. The CHCS system is not used to order or fill prescription medications on board ships.

Generalizability

Incomplete demographic information (e.g. unspecified marital status, race, or ethnicity) can limit the generalizability of these data to specific minority groups. Demographic information not provided in this database can be supplemented with other available personnel databases.

Comparability

These data are generated from the pharmaceutical treatment records of a highly specific patient population – military service members and other military beneficiaries – which differs from the general US population in many ways, including average age, gender distribution, physical fitness, and health status. Further, this population has universal access to medical care, which is not true of the US population. These differences limit the comparability to the general US population. Extra precautions need to be taken when extrapolating data to larger populations and also when comparing the disease rates and trends of the military and non-military populations.

All Data Fields (Variables)

The following section describes frequency distributions run on all fields within the HL7 IV data, available at NMCPHC since 6 July 2009. Any problems that arose in relation to data values were addressed with DHSS and resolved to the best possible conclusion. The data fields of most interest include RXC segment data, sponsor ID, FMP, service, requesting facility, performing facility, and other fields that are necessary for the EDC's planned surveillance activities.

Automatically Populated Fields

There are several types of automatically populated fields in the pharmacy IV data.

When a facility registers within the CHCS, several variables are created, which identify the facility: performing Defense Medical Information System identifier (DMIS ID), performing facility, performing facility service, performing work center, pharmacy site, requesting DMIS ID, requesting facility, requesting facility service, and requesting work center.

When DHSS compiles the data from the CHCS server, two fields are automatically populated: DHSS load date and DHSS load time.

Each patient or beneficiary is registered in the Defense Eligibility Enrollment Reporting System (DEERS) under the sponsor ID, which feeds into the CHCS system. When a patient presents at a medical facility the sponsor ID (usually the Social Security number) is entered and their name is chosen from a drop down list. The following patient demographic fields are automatically populated after this selection, if they were entered when the patient was registered in DEERS: date of birth, ethnicity, FMP, gender, marital status, patient category, patient ID, race, service, and sponsor ID. If these data are not present in the system, a designated unknown value is entered, and therefore there are no missing values in these fields. Registration is completed and records updated when the sponsor reports to a new unit and selects an MTF. Administrative personnel at the MTF have the ability to edit records at the time of visit.

As records are created, edited, and completed, transaction date and time variables are created by the CHCS system. These variables can be changed, if necessary, by the pharmacist, but this change is not common practice. Message date, message time, and message sending facility are created and assigned when the message (record) is sent to the CHCS server. A timeline of the most common order of date variables observed in the data is presented in Appendix A.

Formatting

Several variables in the IV pharmacy data contain numerical values. A few of these fields may contain leading zeros that would affect analysis if lost: sponsor ID, patient ID, FMP, performing facility DMIS ID, and requesting facility DMIS ID. In order to maintain the data integrity these fields should be imported in character format.

Generation of Facility Information

When each facility registers with CHCS, the facility name is created. Each record generated from the location will have the same facility name. If the facility name was entered incorrectly (e.g. if it was misspelled), it will be consistently incorrect in all records from that facility. Within each facility there are a variety of work centers that can generate pharmacy records. The work center variable is a free text field that the ordering physician fills during order generation.

The EDC has provided DHSS with an official DOD DMIS ID list. This list is used to create a DMIS ID for each record based on the information contained in the facility name field. Once records have been assigned a DMIS ID, additional fields describing the facility are created: DMIS facility name and facility service. If the DMIS ID is missing, either because the facility name was missing or a correct match was not made, these variables are also missing. Furthermore, a secondary quality assurance check is performed on the raw data once it is received at NMCPHC. Records with null values in the DMIS ID field are identified. For those records, an algorithm based on the requesting and/or performing facility name fills in the DMIS ID.

The DMIS ID is listed for both the requesting and the performing facility. Requesting facility DMIS ID indicates which facility placed the order for a prescription. Performing facility DMIS ID indicates the facility at which the prescription was filled. Information about the performing or requesting facility may be useful for certain projects.

Field Observations (in alphabetical order):

Appendix E, which contains a timeline and a brief description of the date variables in the data set should be consulted to better understand the relationship of the dates included.

Date of Birth

The date of birth field is formatted YYYYMMDD. Birthdates are valid in over 99% of records (invalid records were those with an impossible date value of '19000000').

DHSS Load Date

DHSS load date indicates the date when DHSS prepares and sends the data to the EDC. The field is used to determine the timeliness of reporting and to identify lags in reporting times from certain MTFs. The format is YYYYMMDD and there are no records with missing values.

DHSS Load Time

Time component of the DHSS load date field, and is formatted: HHMM. The values present in the data are 0300, 1000, 1600, and 2000, and there are no records with missing values.

Duration

The duration field indicates how long the medication should be administered after it is started. Values consist of one character followed by up to two numbers. The character indicates the unit of time associated with the numbers and can be: S=seconds, M=minutes, H=hours,

D=days, W=weeks, L=months, or X=times at interval specified in the order. Values for this field are missing in 7% of records, and all character values observed were "D".

End Date
The end date field contains the date the medication dispensing is to be stopped. The format is YYYMMDD and the value for end date is missing in 8% of records.

End Time
The end time field contains the time the medication dispensing is to be stopped and is related to the end date variable. The format is HHMM, with a range of 0000 to 2400. The value for end time is missing in 8% of records.

Ethnicity
Ethnicity is a numeric field with six possible values: 1=Hispanic, 2=South East Asian, 3= Filipino, 4=Other Asian Pacific Islander, 9=Other, and Z=Unknown.

There are no missing values in this field. However, approximately 9% of records in the extract examined were unknown, and 79% were other. These results indicate that the ethnicity field may be self-identified and is not consistently reported. This lack of specificity potentially limits the ability to identify disease trends and burden in minority groups unless the data are supplemented from other personnel information.

FMP
FMP is the family member prefix, which designates the relationship of the patient to the sponsor. The distribution of FMP was as expected, with the highest numbers occurring in 1-3, 20, and 30. The value for FMP is missing in less than 1% of records. A full list of FMP codes is available for analysis.

The FMP field is automatically populated in the CHCS system. When the sponsor ID is entered, the possible patient names are listed. When the appropriate patient name is selected, the FMP field is completed.

Frequency of Administration – Interval Repeat Pattern
This field contains the code indicating the repeat pattern for administration of the drug. Definitions for all values present are not available, but possible values include BID (bi-daily), TID (tri-daily), etc. This field is described by CHCS as "unexpanded times"; however, the majority of values present in current data include explicit time(s) and not the expected values. Values for this variable are missing in 44% of records.

Frequency of Administration - Interval Explicit Times
The field explicitly lists the exact times when the patient should be given the medication. The format for this field is HHMM, HHMM, (…), and values are present for this variable in less than 1% of records.

Frequency of Administration - Frequency

This field contains the code indicating the frequency with which the order should be carried out. Definitions for all values present are not available, possible values include BID (bi-daily), Daily, Mo-We-Fr, and so forth. Values are missing in 44% of records.

Gender

There are three values possible for gender: M=male, F=female, and X=unknown.
There are no missing values for gender and there are less than 1% with a value of unknown.

Marital Status

There are nine values for marital status: A=annulled, D=divorced, I=interlocutory decree, L=legally separated, M=married, N=never married, S=single/not married, W=widow or widower, and Z=unknown.

There are no missing values for marital status. However, 9% of all records are categorized as unknown. Single/not married and married account for the largest percentages of those with known values.

MEPRS Code

The Medical Expense and Performance Reporting System (MEPRS) code is a four letter code that indicates where within the MTF the person received treatment. The first letter indicates the most general area and translates as: A=inpatient, B=outpatient, C=dental, D=ancillary, E=support, F=special programs, and G=readiness. It is advised that an up-to-date list of all possible codes be obtained. The field is useful for tracking where people are seen within the MTF. For instance, it can indicate ambulatory care, special dialysis clinics, the maternity ward, and so on, which can affect the interpretation of the data.

The majority of records contained in the IV dataset had an MEPRS code that began with A (68.4%) or B (25.9%). There are no records with missing values for this variable.

Message Date

This field is automatically assigned in CHCS when the order is completed in the system and sent to the CHCS server. The date approximates the transaction date but it can vary between locations. Some MTFs send messages in batches, therefore the date portions may not correlate to the actual transaction date. This field is formatted: YYYYMMDD. There are no missing values for this variable.

Message ID

Message ID is an alphanumeric code assigned to each batch of messages based on when the message is sent from CHCS to the server. The message ID is not unique to each record; each batch of messages is assigned one message ID. The format of message ID varies by MTF and includes numbers, letters and/or a numeric code that identifies the MTF or it can identify the function of the message (e.g. RESCHED-057342). There are no records with missing values for this variable.

Message Sending Facility

This field identifies the facility that sends the message to DHSS through the CHCS system. This field allows analysts to identify and track problems that arise in the transfer of messages from the MTFs through DHSS to the EDC. There are no records with missing values for this variable.

Message Time

This field is automatically assigned in CHCS when the order is completed in the system and sent to the CHCS server. The time approximates the transaction time but it can vary based on location. Some MTFs send messages in batches, therefore the time portions may not correlate to the actual transaction time. This field is formatted: HHMM.
There are no missing values for this variable.

Number of RXC Segments

This field indicates the number of fluid and drug items used to make the IV medication. The range of values present in current data is 1 to 28, and the value for this field is missing in 7% of records.

Order Control

The order control field designates the type of order.   Values include: CA=cancel, DC=discontinued, HD=hold, NW=new, RL=release, RN=renew, and RP=replace order-modify. This field allows analysts to track some of the changes made to an order over time. The identification of order type is important if the question of interest relates to incident cases. There are no records with missing values for this variable.

The data dictionary also identified RE=refill, RO=replacement order, XX=edited order, and ZP=prevalidate-preverification request and response as possible values but they are not included in any of the extracts.

Order Control Code Reason

The order control code reason field contains the code or text describing the reason for the order event that is described in the order control field. The value for this variable is missing in all records.

Order Number

Order number is a numeric code of eleven digits (xxxxxx-xxxxx) unique to each order but not unique for each record. An order can have multiple records that correspond to changes made to the order (e.g., changes in dosage or frequency of application, cancellations). All changes appear as individual records with the same order number. It is a plausible way to track a patient but it is not useful for identifying unique records. There are no missing values in the order number field.

Order Priority

The order priority indicates the priority of the prescriptions. Possible values include S=STAT, A=ASAP, R=routine, P=pre-op, and T=timing critical. All values, except T, are present in the current data, and values are missing in 7% of records.

Order Status

Order status field designates the status of an order. Values include: CA=cancelled, DC=discontinued, HD=on hold, and RP=order replaced. This field indicates the status of the order when the message was created. Values for this variable are missing in 49.7% of records.

The data dictionary also identified CM=completed, ER=error, order not found, IP=in process, unspecified, and SC=in process, scheduled as possible values but they are not present in the data.

Order Text

The order text field includes the free text version of the information included in the prescription. This field is blank in all records.

Ordering Provider

The ordering provider field indicates the name of the prescribing physician. It has four components separated by ",": last name, first name, middle name (or initial), suffix. It is structured to facilitate analysis but could be separated if necessary. There are no records with missing values for this variable.

Patient Category

The patient category is an alphanumeric code that indicates the patient's relationship to the uniformed services. The first letter of the code refers to the branch of service of the sponsor (A=Army, B=National Oceanic and Atmospheric Administration, C=Coast Guard, F=Air Force, K=other beneficiaries of the federal government, M=Marine Corps, N=Navy, P=US Public Health Service, R=NATO Recipient). It is followed by two digits corresponding to the status of the sponsor, as well as the patient's relationship. For example: A11=Army active duty member, A41=Army dependant of active duty, etc. A complete list is available from the DOD for analysis. Values for this field are missing in less than 1% of records.

Patient ID

The patient ID is intended to serve as a unique identifier for each patient. In the data dictionary provided by DHSS, it states that the patient ID is the patient's SSN, when available. Patient ID is missing in less than 1% of records. The field is formatted as a character string rather than an integer so that leading zeroes are not dropped.

Based on the EDC evaluation, the patient ID should not be used to identify patients. This field may contain an ID number assigned by the facility to a patient instead of the patient's SSN, and therefore cannot be used to match with other data sources or follow a patient across multiple

facilities. It is recommended that sponsor ID and FMP be used together to create a unique identifier instead.

Performing DMIS Facility Name

This field is the text translation of the DMIS ID provided in the performing DMIS ID field. The value for this variable is missing in 3% of records.

Performing DMIS ID

The performing DMIS ID is a four digit code that identifies the performing facility. This code allows for grouping of MTFs based on geographic location, as well the ability to identify parent/child relationships between installations. The value for this variable is missing in 3% of records.

Performing Facility

The performing facility field in CHCS indicates the name of the MTF where the order is filled. There are no records where the value of this variable is missing.

Performing Facility Service

The performing facility service field indicates the service branch that the MTF that filled the prescription. There are missing values for this variable in 3% of records. The possible values for IV records are: A=Army, F=Air Force, and N=Navy.

Performing Work Center

The performing work center field indicates the specific work location within the pharmacy or MTF that provides the prescription to the patient. There are no records with missing values for this variable.

Quantity to Administer

The quantity to administer field contains the number of items per administration of a medication. This is a numeric field, and the values present are 0 (7%) and 1 (93%). There are no missing values in this field.

Race

There are six possible values for race; C=white, M=Asian or Pacific Islander, N=black, R=American Indian or Alaskan Native, X=other, and Z=unknown. There are no missing values for race. However, approximately 9% of the records are classified as unknown.

Record Type

DHSS enters a value of "PIV" for all pharmacy intravenous records. The value does not change between extracts and there are no missing records. The field has an analytic value if different HL7 datasets are used in a single analysis as it will serve to identify the source of the individual record.

Requesting DMIS Facility Name

This field is the text translation of the DMIS ID provided in the requesting DMIS ID field. There are missing values for this variable in 2% of records.

Requesting DMIS ID

The requesting DMIS ID is a four digit code that identifies the facility that ordered the prescription. This code allows grouping of MTFs based on geographic location, as well as to identify parent/child relationships between installations. There are missing values for this variable in 2% of records.

Requesting Facility

The requesting facility field is the field in CHCS that indicates the name of the MTF where the order originated. There are no records with missing values for this variable.

Requesting Facility Service

The requesting facility service field indicates the service branch of the facility that requested the prescription. There are missing values for this variable in 2% of records. The possible values for IV records are: A=Army, F=Air Force, and N=Navy.

Requesting Work Center

The requesting work center is the ward or clinic within the MTF that requests the prescription. There are no records with missing values for this variable.

Route of Administration

The route of administration field contains abbreviations of the route of administration of the medication to the patient. Values in this field include INJ=injection, INH=inhalation, etc and are missing in 7% of records. Definitions for all of the values present in this field are not available.

RXC Segment Data

This field contains the medication component data for the IV order. Each RXC segment has four parts separated by "\". This field contains one RXC segment for each fluid and drug used to make the IV medication (the total number is indicated in the number of RXC segments field). The four parts are the NDC number, drug or solution name, amount, and units. The segments are separated by the "#" symbol.

The NDC number is a unique three-segment code used to identify a drug. The segments are separated by "-". Every drug manufactured, prepared, propagated, compounded, or processed for commercial distribution is required to be registered with the Food and Drug Administration (FDA) and receives an NDC. The first portion of the NDC is the labeler code, which identifies the company that manufactures or distributes the drug under its label. The second portion of the NDC is the product code which identifies the strength, dosage, and formulation of the medication. The final portion is the package code which identifies the package size and type (i.e. number of pills).

Drug name is a text translation of the NDC code. The general format is: scientific name (trade name) dosage. Records with some drug names are filtered out of the pharmacy data on a regular basis. The filter excludes the full records for all medications specifically used to treat HIV/AIDS. HIV/AIDS medications are determined from the Tri-Care formulary under HIV specific anti-retrovirals.

The third part of the segment, amount, contains how much of the medication is dispensed. The number is directly related to the units contained in the fourth part of the segment.

The final portion of each segment indicates the units associated with the amount of each solution or drug used to create the medication.

Service

The service field refers to the service branch of the sponsor. The value is determined from the first component of the patient category field and the values are the same.

Therefore, there are less than 1% of records with missing values for service, the same records missing patient category codes.

Sponsor ID

The sponsor ID field corresponds to the SSN of the sponsor and is in the format of xxxxxxxx, with no dashes. Values for this field are missing in less than 1% of records. Records with a missing sponsor ID are also missing values for FMP. Sponsor ID is not sufficient to serve as a unique identifier for each patient but it can be used in conjunction with the FMP to identify each patient.

Start Date

The start date field contains the date the medication dispensing is to be started. The format is YYYMMDD and the value for start date is missing in 8% of records.

Start Time

The start time field contains the time the medication dispensing is to be started and is related to the start date variable. The format is HHMM, with a range of 0000 to 2359. There are less than 1% of records with the value above 2400, which is invalid. The value for start time is missing in 8% of records.

Transaction Date

The transaction date is the date that the order enters the CHCS system. It is different from the message date since the message date is generated when the label is printed and the transaction date more accurately approximates when the prescription is actually presented to the pharmacy. The transaction date is formatted YYYYMMDD and does not include missing values.

Since the field approximates the time that the medication is ordered it may or may not be useful for future analysis. It can be used to identify medications that are pre-ordered (for surgeries), allow for time analysis between the prescription order date and when it is picked up and can allow analysts to look at time lags between when medications are ordered and when the data are available for use in the EDC.

Transaction Time
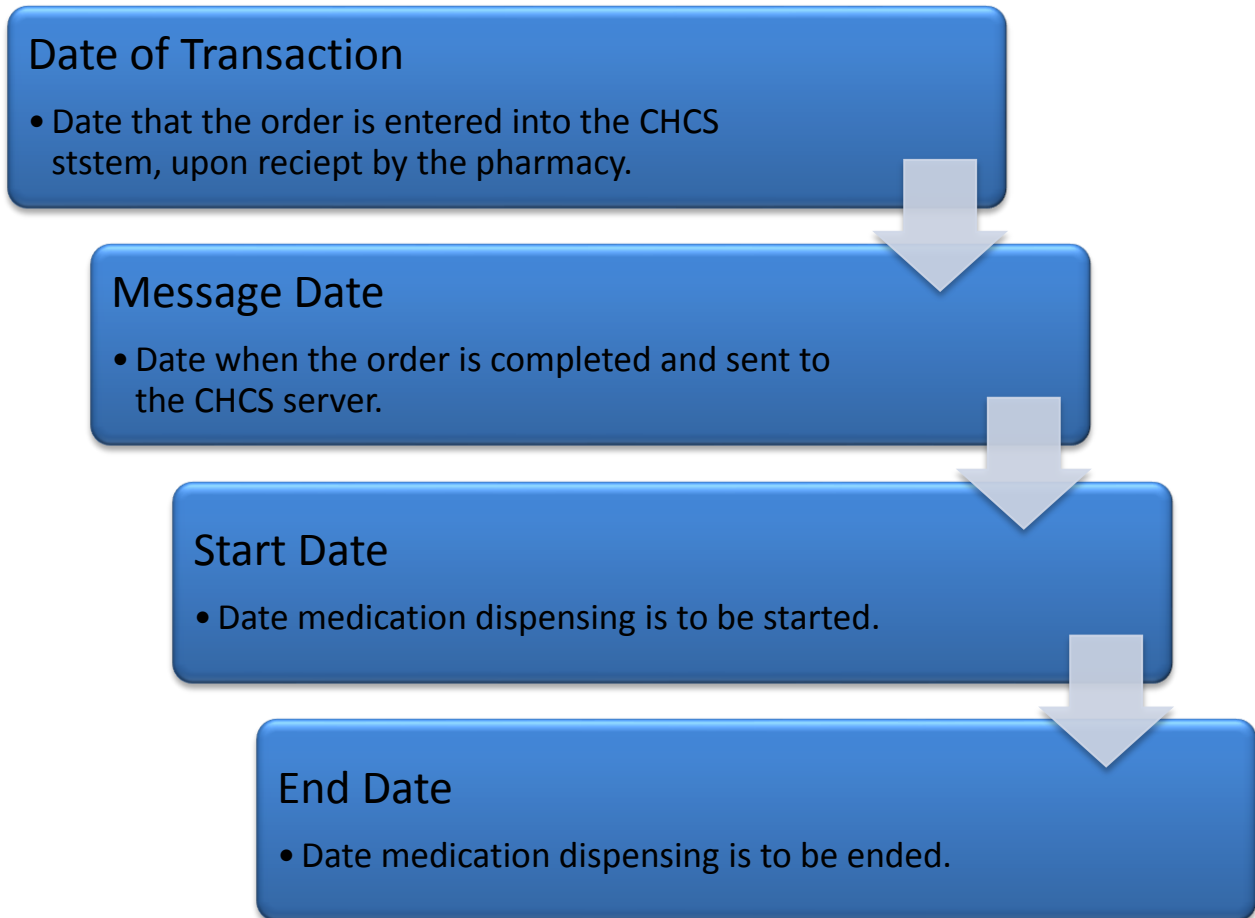
The transaction time field represents the time component of the transaction date formatted as HHMM, and ranges from 0000 through 9000. Some values in this field past 2400 are invalid based on the format. There are no records with missing values for this variable.

Units

This field contains the units specified in the medication order. The value for this field is missing in all records.

Appendix A: Timeline of Dates

Date of Transaction

• Date that the order is entered into the CHCS ststem, upon reciept by the pharmacy.

Message Date

• Date when the order is completed and sent to the CHCS server.

Start Date

• Date medication dispensing is to be started.

End Date

• Date medication dispensing is to be ended.

* The timeline above represents the relationship of the dates in the order that is most often observed in the HL7 Pharmacy Intravenous dataset. Some records do not follow this timeline due to the timeliness of data entry. Also, the relationship between DHSS load date, start date, and end date varies based on the delay between the order and the medication administration start and the duration of medication administration.

Appendix B: Abbreviations and Acronyms

CHCS	Composite Health Care System
DEERS	Defense Eligibility Enrollment Reporting System
DHSS	Defense Health Services System
DMIS	Defense Medical Information System
DOD	Department of Defense
EDC	EpiData Center
FDA	Federal Drug Administration
FMP	Family Member Prefix
HL7	Health Level 7
ICD-9-CM	International Classification of Diseases, 9th Revision, Clinical Modification
IV	Intravenous (Pharmacy Dataset)
MEPRS	Medical Expense and Performance Reporting System
MHS	Military Health System
MTF	Military Treatment Facility
NDC	National Drug Code (Can be in the form of a code or a name)
NMCPHC	Navy and Marine Corps Public Health Center
PDTS	Pharmacy Data Transaction Service
SADR	Standard Ambulatory Data Record
SIDR	Standard Inpatient Data Record

Appendix C: Glossary

True Duplicates	Records in which all fields are exactly the same; only one of these records should be used in analysis.
Unique Order	All records associated with each specific drug prescription.
Unique Record	All transactions associated with each prescription for an individual patient.
Unique Patient	The combination of sponsor ID and FMP creates a unique identifier that can be used to track individual patients through all pharmacy records.

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